MILITARY

SIGNALS

LAND ★ SEA ★ AIR

NOVEMBER-DECEMBER 1949

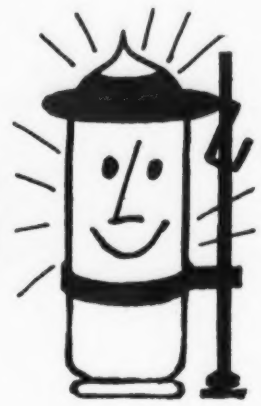
Maj. Gen. H. M. McClelland

Do your miniatures
die prematurely
of the heat in their
metal overcoats?

Switch to air conditioned

TOP HAT RETAINERS

for normal tube life expectancy.



Top Hat Retainers hold your miniatures in without restricting the air flow. Tube heating is reduced, and tube life is increased to normal rating.

Because the tube socket is completely exposed, tube pins may be easily aligned with socket holes, thus eliminating the danger of bending or breaking pins when inserting tube.

The Top Hat Retainer consists of two parts—a stainless steel hat with a grip clip and an 8-32 threaded post. A #18 drill hole centered 11/16" from the socket centerline is required for mounting the post.

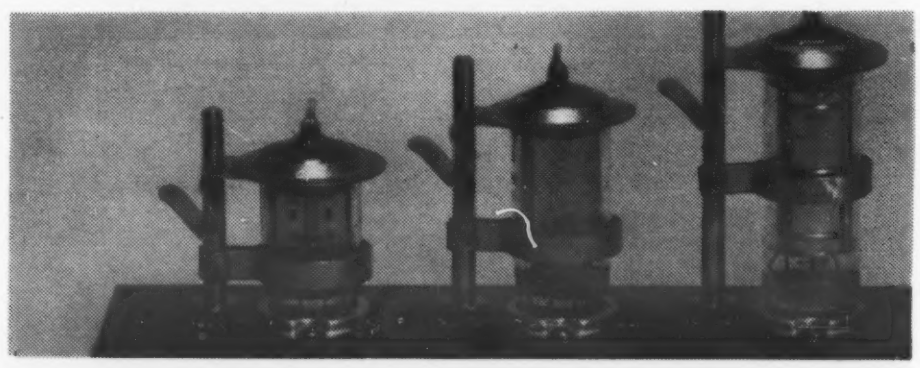
No. 6 Hats fit all 7 or 9 pin miniature tubes, and may be purchased separately.

Series 200 stainless steel posts with welded bands should be used for all conditions where extreme shock is anticipated. Available in sizes to fit all 7 and 9 pin miniature tubes.

For ordinary service conditions, series 20 stainless steel posts without bands may be used. Come in three lengths to accommodate various tube heights.

Top Hat Retainers are also available for conventional metal or glass tubes including the ST-19 envelope and for plug-in condensers or relays. Send for literature covering complete line.

Top Hat Retainers with series 200 post for miniature tubes.



TIMES FACSIMILE CORPORATION

A Subsidiary of The New York Times Company, 229 West 43rd Street, New York 18, N. Y.

MILITARY
SIGNALS
LAND ★ SEA ★ AIR

Journal of the Armed Forces Communications Association — Dedicated to Military Preparedness

VOLUME 4 NOVEMBER-DECEMBER, 1949 Number 2

CONTENTS

FEATURES

Communications — How? 5
World War II Communications-Electronics Commands 9
Western Union Telegraph Co. Operation 12
Inshore Navigation with Radar and VPR 16
Security of Communications 18
McClelland in "Highways In The Sky" (excerpt) 21
Relationship of ASESA with Industry 22

ACCESSORY

Please Pass the Carrots (Dept. of Errors) 23
AFCA Constitution and By-Laws 26
Joint Communications Insignia (a letter) 52
AFCA Charter Members (list) 54

DEPARTMENTS

Editorial 8
Association Affairs 24
AFCA Directors and Officers 24
National Advisory Committee Chairmen 25
AFCA Group Members 28
Chapters 29
Chapter News 29
News—Services and Industry 40
General 40
Navy
Air Force
Signal Corps
Civilian Components
Letters to the Editor 51
Books and Services 62
Index to Advertisers 64

Picture Credits: All pictures official Army, Navy, or Air Force photos unless otherwise credited. Photos, pages 12 to 15 by Western Union Telegraph Company.

EDITOR
Brig. Gen. S. H. Sherrill (Ret.)

MANAGING EDITOR
Wallace R. Fingal

ASSOCIATE EDITORS
Capt. Ward Clarke, Hq. AACS
Air Force Communications News
Comdr. Guy M. Neely, U.S.N. Res.
Navy Communications News
Maj. Bruce Quisenberry, Sig. Corps, Res.
Signal Corps News

CIRCULATION MANAGER
A. R. Lorah

HEADQUARTERS SECRETARY
Erma M. Kile

ADVERTISING REPRESENTATIVES
Woolf & Elofson, Inc.
70 East 45th Street
New York 17, N. Y.
Tel. ORegon 9-5188
854 Hanna Building
Cleveland 15, Ohio

SIGNALS is published bi-monthly by the Armed Forces Communications Association at 1624 Eye St., N. W., Washington 6, D. C. Entered as second-class matter at Post Office, Washington, D. C., September 6, 1946, under Act of March 3, 1879. Additional entry at Baltimore, Md.

Subscription rates: 1 year (6 issues), $5.00. To foreign post offices, $6.00. Single copies, 75c plus postage. All rights reserved. Copyright 1949 by Armed Forces Communications Association. Reproduction in whole or in part prohibited except by permission of the publisher. Printed in U.S.A. by Monumental Printing Co. at Baltimore, Md.

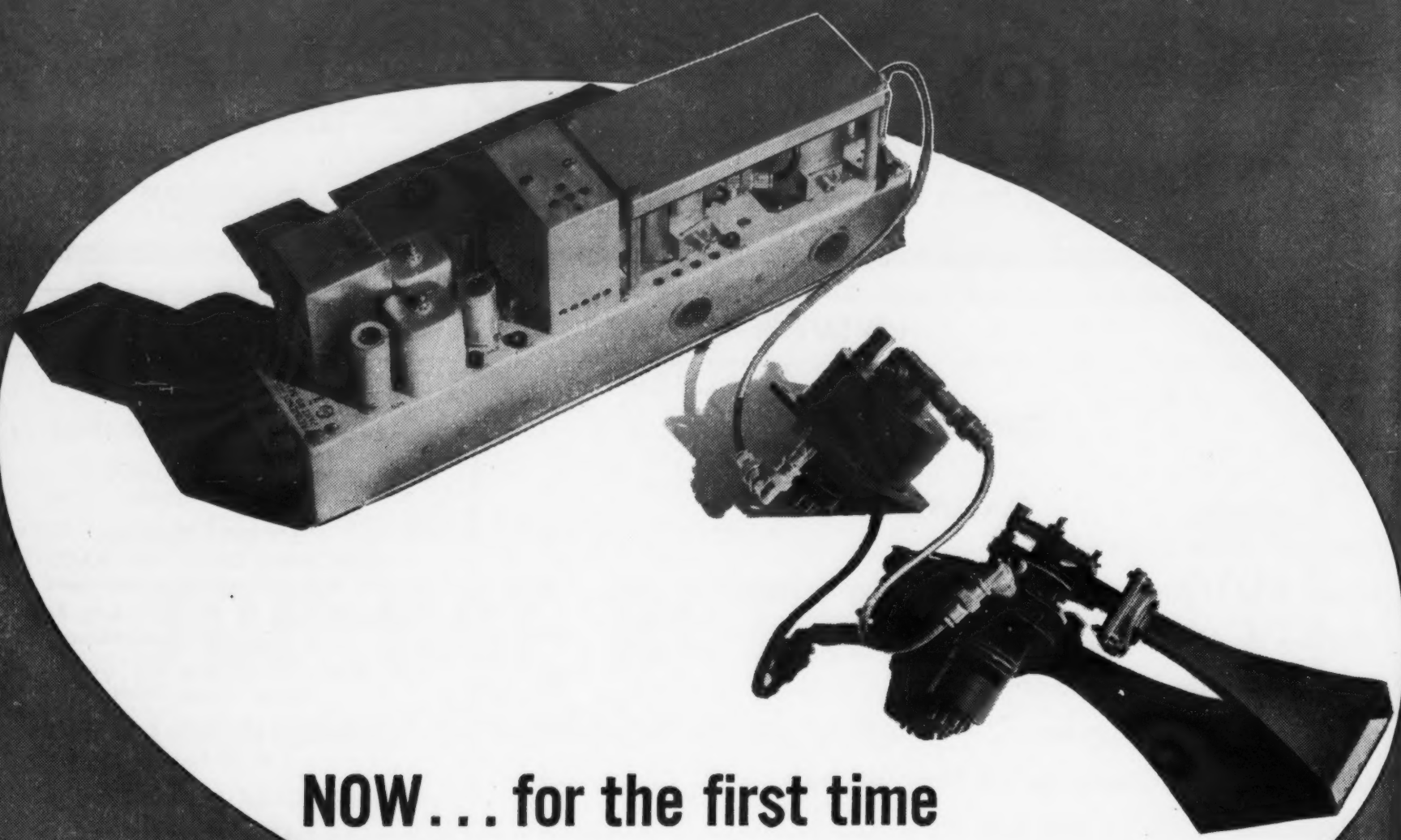
The publisher assumes no responsibility for return of unsolicited manuscripts or art. Authors are responsible for opinions expressed in articles.

When sending change of address, please list both the old and new addresses, and allow 3 weeks for delivery of first copy.

THE COVER

The Department of Defense recently created the office of director, communications-electronics for the joint chiefs of staff, and Maj. Gen. H. M. McClelland, USAF, portrayed on our cover, was selected to fill the post.

Gen. McClelland wrote the editorial for this issue, page 8. For other matter relating to Gen. McClelland and his new assignment see pages 21 and 42.



NOW... for the first time

SUBSTANTIAL POWER

At Microwave Frequencies with Direct Crystal Control

Now, with two new Sperry Klystron tubes, stabilized frequency control is possible at 10,000 mc. with 1 watt continuous wave power output. These multiplier tubes, the SMC-11 and the SMX-32, permit direct crystal control at microwave frequencies with this power level.

Starting with a 5 mc. crystal, the frequency is multiplied to 830 mc. by use of an *Exciter.* The SMC-11 Klystron multiplies the 830 mc. to a frequency of 5,000 mc. The SMX-32 then multiplies this frequency to 10,000 mc. with the same accuracy which exists in the control crystal (±0.0005%).

This practical achievement of 1 watt power output with continuous accuracy of frequency control at 10,000 mc. exists only through the use of these two Sperry Klystrons.

Write our Industrial Department for further information.

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION
GREAT NECK, NEW YORK

NEW YORK • CLEVELAND • NEW ORLEANS
LOS ANGELES • SAN FRANCISCO • SEATTLE

If we are to have
An adequate communications system,
In the event of another war,
We must order it now!

COMMUNICATIONS—HOW?

By Lt. Col. Roger C. Power, Jr.

U.S. Marine Corps

It is Dog Day, How Hour-minus two, and Pvt. John Jones trips as he carries his radio out of the blackout baffles around the entrance to the passageway of the blacked-out ship. Fumbling in the dark, he and his corporal attempt to erect a TBX on the deck of the ship, cursing as it rolls to and fro with an attendant scattering of parts. For the next two hours they attempt to operate within a black-out shelter formed of shelterhalves, until finally morning twilight allows them to discard the shelter and breathe once more.

How many "communicators" in the Marine Corps experienced just such a thing during the last war? Was our communication equipment adequate to do the job at hand—the job of providing a "voice" for our unit commanders? Did we have the latest equipment and the equipment that met all the requirements for an amphibious operation? The answer obviously is "No." Granted that communications worked and the message did "get through," but it was oftentimes due to the good leg-work of some strong-backed messenger on foot. Such slow methods of communicating command decisions, while not desirable, had to be tolerated in the last war due principally to equipment deficiencies. With the advent of A-bombs and supersonic missiles and aircraft, such delays can not be tolerated.

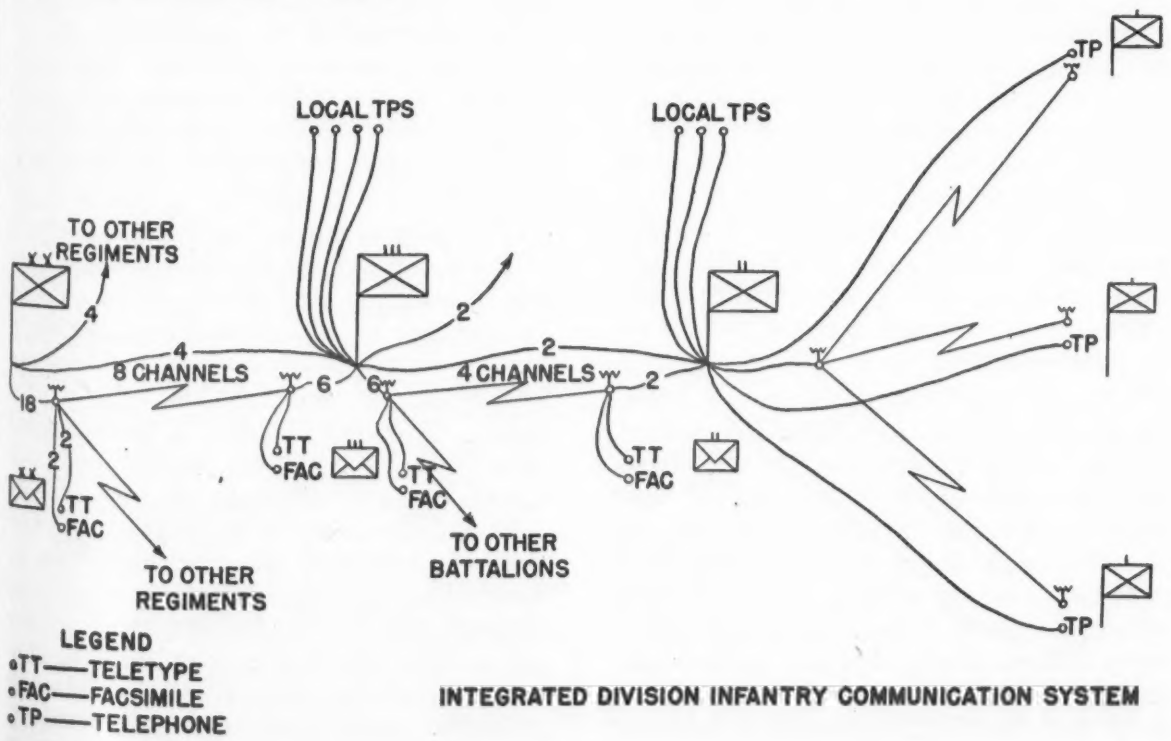
Take the example of the radiomen who had to stumble around the blacked-out decks of our ships on D-day to erect equipment, or the wiremen who had to string field wire along the overheads and place phones in troop compartments for interior communications. Such methods were jury rigs and they worked, but they were not the efficient systems that will be needed in the event of another conflict. Of course, the answer to this problem is simple and obvious, and it is hoped that it will be solved within the near future. The landing force and its subordinate units, no matter on what types of ships it is embarked, must have available to it certain radio equipments which are installed as an integral part of our amphibious ships and craft, and which are specifically "earmarked" for those units. Also the interior communication facilities of all amphibious ships must be expanded to the point where adequate teletype, air-tube, sound-powered or automatic telephone circuits are available to the troop commander. The radio equipments earmarked for the use of the landing force should be of the type and number necessary for commanders to handle all tactical traffic. If such a dream situation can be realized, it would mean that our communication platoons and signal units, instead of having to ruin the waterproofing by unpacking radios and wire equipment that will be used ashore, will be able to walk aboard our amphibious ships and craft and, in a matter of about an hour, have a message center running and radios ready and waiting to break silence on Dog-day upon signal from the attack force commander. Organic equipment, that is to be handpacked ashore, could then be available at any time for loading into landing vehicles or craft.

That, then, would adequately satisfy the communication requirements of the various landing force headquarters while they are embarked on amphibious ships. However, the question still arises as to the adequacy of our equipment for our particular operations when the landing force is ashore. It is well known that all equipment used in amphibious operations must be rugged, light in weight, small in volume and waterproof (preferably immersion rather than splash-proof). These characteristics must be built into the equipment as it is manufactured. Was our equipment of that type in the last war? Here again the answer is emphatically "No." It is doubtful if there was any amphibious operation in which the landing force didn't suffer some degree of communication equipment casualties just from lack of waterproofing alone. Rubber-coated or water-repellent canvas bags could be a partial answer, but they do not usually permit the equipment to be operated while so contained.

Aside from the physical characteristics of the gear, however, we must consider other problems in our communi-

Courtesy: Marine Corps Gazette.

Wire, radio, teletype, and facsimile components are all integrated into this proposed system for an infantry division.



INTEGRATED DIVISION INFANTRY COMMUNICATION SYSTEM

cation system—the problem of speed of transmission and flexibility of the system. Naturally a radio message, once it gets started and the radio wave leaves the antenna, travels with the speed of light, so it could be argued that we have the problem of speed of transmission licked. That argument does not take into effect the time delays that enter into a message from the time it is written by the originator, delivered to message center, encoded, transmitted, decoded and delivered to the addressee. These delays oftentimes add up to a period of hours and again cannot be tolerated in future warfare.

No System

The second problem—that of flexibility of the system—has not been licked simply because of the fact that we have no "communication system." Oh, yes, we do have communication plans, frequency plans, SOPs, SOIs and pieces of equipment to implement all the foregoing. But, and the *but* is important, these pieces of equipment are, as the name implies, simply pieces and not a system. By this statement, it is meant that the various pieces are designed and built not to be integrated into an overall "communication system" but to be used in single point to point circuits or radio and wire nets. Webster defines a system as "an assemblage of objects united by some form of regular interaction or interdependence" and what form of "regular . . . interdependence" do we have between a TBX radio and BD-72 switchboard?

What, then, do we need in a communication system that will make it have the physical and electrical characteristics desired, and will give us speed of transmission and flexibility?

Let us look first at the physical and, of course, electrical characteristics. Few of our radios and switchboards are capable of being transported by one man or even two men. Recent newspaper articles have indicated that many commercial firms are rapidly realizing our desires for smaller and smaller components to be made an integral part of the electronic equipments we use. An example of this would be the Bell Telephone Laboratories' "transistor" which can be a replacement for many of our radio tubes and has, in addition to its small size and light weight, the feature of being fairly rugged because it is made of metal and not of glass as are our present-day conventional tubes.

By proper utilization of miniaturization and subminiaturization techniques and the newly developed technique of enclosing entire stages of radio sets in plug-in plastic units, it will be entirely possible to devise equipments that are approximately one-half the size of our present-day sets and have built-in immersion-proof or splash-proof features. These characteristics of our components of our communication system must, of necessity, be left to the design engineers both within the armed forces and in industry, but we in the Marine Corps must make our need for such characteristics well known to those engineers.

The characteristics of speed of transmission and flexibility are interrelated and should be considered along with other features such as security. The fastest transmission speed through space of which we know is that of light and electro-magnetic waves. We can rule out the use of light mainly due to its lack of security unless we talk in terms of infra-red sets. However, contrary to the popular belief, infra-red rays do not have the ability to penetrate clouds, fog or other unfavorable weather to any greater extent than ordinary light. Thus we cannot utilize it to form a communication system that must work regardless of weather conditions. This brings us to the use of electro-magnetic waves and electronic devices for our high speed, flexible, secure system.

Presuming, and the presumption is based on fact, that the engineers, be they in the armed forces or industry, can give to us equipment that is small and light, equipment that is waterproof, and equipment that is so rugged that failures would reduce to one in ten thousand, we still must contend with operators. These operators might be hastily trained and oftentimes unfamiliar with the equipment, so we must ask for equipment that is simple to operate. It must be of the "push-button" variety —push one button to turn it on and possibly turn one knob to increase the volume. This means that, insofar as radio sets are concerned, they must be crystal controlled or preset (in rear area maintenance shops) and impossible of drifting off frequency. Such a feature would have the added advantage of infallibility of netting equipment since tuning would not depend upon the proper interpretation and interpolation of frequency curves by an experienced operator.

Speed-up Needed

Now let us look at the problem of increasing the speed of transmission. It was previously stated that delays are encountered in internal handling of a message and encoding and decoding, all of which have nothing to do with the electronic transmitting and receiving device. In any adequate communication system such delays should be overcome by incorporating the necessary handling, coding, etc., into the electronic device doing the transmitting either as an integral part or as another small component.

Message traffic is not the only place where a speed-up is required, however. Suppose Col. Hollowhead of the Blank Marines desires to communicate and confer with Col. Standpat, the G-3 of division, and it so happens that Col. Standpat is inspecting the front-line situation. How is he going to communicate, much less have a conference, which implies a conversation, unless he goes and finds him or sends a message to Col. Standpat, who, like all good G-3s, has his radio and radioman with him?

In other words, at the present time, there is no standard method whereby a commander, having a radio with him, can pick up the handset of that radio and talk with another commander who is not near a radio but does happen to have a telephone handy. If we are to have a "communication system" that offers speed and flexibility, we must integrate our wire and radio nets to such an extent that it makes no difference to the person conducting a telephone call as to whether his word is traveling over a metallic loop or is going through space.

Security Problem

At this point, we must interject a note of warning about security, a subject known by all and hated by many because it usually causes difficulties and delays. However, when we achieve such an integrated system of wire and radio, we must achieve with it a security device that will preclude the necessity of warning an individual that his voice is traveling through space and not over a wire line.

With all of the foregoing thoughts well in mind, let us attempt to build a "communication system" for a Marine Division. As far as the physical characteristics are concerned we will assume that for units of the size of companies and battalions each equipment must be capable of being carried by one or two or, in rare instances, three men. For units of regimental size, during the initial phase of an operation, battalion type equipment will be used, to be replaced, when vehicles can get ashore, with jeep-mounted or jeep-transportable equipment. For division headquarters, some portable types should be available, but the majority of the equipment should be carried in the necessary number of truck-mounted shelters like the House, HO-17. Having established these physical requirements, let us now turn them over to the engineers and rest assured that they are well within the realm of possibility.

We will limit our system to a consideration of the main infantry command channels with the understanding that it can be applied to attached and supporting arms and services.

The first requirement for integrating our wire and radio circuits is, very simply, a switchboard. Our present switchboards are quite incapable of taking a conversation from a distant telephone and having it modulate the output of a radio. We should have a switchboard that will be able to interconnect all telephones and all types of radios freely and with no loss in intelligibility. The distance at which the telephone can be located from the switchboard should be limited only by the talking range of the wire with which the telephone is connected to the switchboard. Having achieved such a switchboard, integra-

w methods of communicating command decisions often had be tolerated in the last war, due to equipment deficiencies. th the advent of A-bombs, and supersonic missiles and aircraft, h delays can no longer be tolerated.

of wire circuits with radio networks fact, and we are already well on our to a system.

Within a battalion headquarters we uld have two (one for echelonment) he above switchboards which would e a minimum of three connections radios and six for wire lines. Thus battalion tactical radio set could be ed onto the switchboard as well as radio circuits to higher headquar- Company commanders would be to converse with adjacent com- commanders in his own battalion though intervening land masses ldn't allow direct contact by very frequency radio.

cases of necessity adjacent com- commanders of different battal- would be able to converse through battalion radio sets working into tactical wire system. The possibili- are many-fold for the use of such pment.

Battalion Level Limited

the present time our electronic munications between battalion and er headquarters are limited to wire, radio, and CW radio. Two other s of communication, at present used by divisions and higher headquar- should be made available down ugh the battalion headquarters. e are teletype and facsimile. With present state of the electronics art, is no reason apparent why, with er development, these two items of pment which are at present so y, cannot, through miniaturization, educed to a size and weight suit- for one or two men to carry. Mak- teletype available to battalions d give them a working substitute he old telegraph set that never has apparently never will operate prop- Trained CW operators would not ecessary for operation and an accu- page copy of the transmitted mes- would be available.

en of greater value than teletype, ver, would be the introduction of a ble facsimile equipment to the lion level. Facsimile equipment any type of printed or written ma- and transmits it either over wire or via radio circuits. Thus written ages could be transmitted as they off the originator's message pad ne originator's own handwriting. handwriting would of itself serve thentication of the message. Fac- e would preclude the necessity for messengers to transmit maps, hes and overlays and would cut the of such transmission. In addition, there are available today, facsimile machines whose receivers cut mimeograph or ditto type stencils of the received message. Such stencils would be of inestimable value to headquarters where multiple copies of received message are required. It would be very simple to remove the stencil copy of the received transmission from the facsimile equipment and run off the desired number of copies on a mimeograph or ditto machine located right in the message center.

So far, we have mentioned a switchboard to integrate wire and radio, teletype and facsimile, but what of better radio equipments? Our present radios at levels lower than division headquarters can only transmit one voice or CW channel on one radio frequency at one time and yet, toward the end of the last war, there was equipment in use between corps and division levels that could transmit three voice and four teletype signals utilizing a single radio frequency channel. Admittedly the equipment was very bulky and entirely too heavy to be used by a battalion headquarters. Here again, miniaturization and other new techniques should be called upon to give us an equipment that would be capable of transmitting two voice, one teletype and one facsimile signal from battalion to regiment, such equipment to be within our previously stated man-pack limitations.

Proposed System

Our communication system is now beginning to take shape, but we must not forget the previous warning about security. If we have equipment that puts voice, teletype, and facsimile signals on the air simultaneously, we must give a possible enemy credit for being able to intercept and gain intelligence from those signals. That leads us to the final component needed in our system at battalion level—some sort of a little "black box" that will give us universal security no matter what type of signal is modulating the radio transmitter. This "black box" would be fitted into our system wherever there is a radio transmitter and receiver and, in some cases could be integral to the transmitter and receiver. It should not be necessary to have separate devices for facsimile, teletype and voice. One device should code or scramble all types of signals.

The sketch on page 5, shows a complete system for an infantry division. It is readily seen how the wire, radio, teletype, and facsimile components are all integrated into one system that meets the requirements previously set forth.

At the regimental level, the equipments utilized to give the regimental portion of the system could be identical with those employed at battalion headquarters with the exception that the radio equipment should be capable of omni-directional transmission of 12 to 15 voice, teletype, or facsimile signals on one radio frequency channel. In that way, one radio could be utilized to receive the four signals from each battalion and possibly handle voice signals from a few supporting or attached units. Also additional components of each type should be available for use, such components to be jeep-mounted so that they could replace portable equipment.

Carrying through to division headquarters we again use the same equipment except that we have more of each type, and they can be carried in truck-mounted detachable shelters. In landing operations where more than one division is employed, extensive installations of duplicate equipment can be carried in truck-mounted detachable shelters. In landing operations where more than one division is employed, extensive installations of duplicate equipment can be made for the landing force (corps) headquarters, and the picture would be complete.

Standardization Need

In designing all of the various portions and equipment of our system, a method of interchangeable components should be established to the practicable limit. That is, common types of components of the various equipment should be interchangeable. For ease of servicing, all equipment should be made of plug-in type units as far as possible so that stocks of these units could be carried by the signal quartermaster ready to be exchanged for unserviceable ones. The multi-channel radios used by all headquarters should operate in the same frequency range so that there would be no difficulty in establishing communications when a new unit is attached to any headquarters.

The system described above is one which should allow any commander to speak, through his "voice," to any of his subordinate or attached units. It is "amphibious" in that it would be capable of being man-handled into small landing craft or vehicles and over landing beaches. Because it is an "amphibious" system, and because of the Marine Corps responsibility for the development of amphibious equipment and techniques, the Marine Corps must ensure that such a system is developed.

During the last war, we had practically no communication equipment at the end of the war that was not in production or about to go into production at the beginning of the war. If we are to have an adequate "communication system" in the event of another war, we must order it now.

V4 2 NOVIDEC 49 XUM

EDITORIAL

UNIFICATION AND COMMUNICATIONS-ELECTRONICS

Unification of the armed forces is still in its infancy. It has, from the day of its conception, elicited much discussion and debate. There are those who herald it as a magic formula that will provide national security at bargain prices. There are others who decry it.

Let us take neither sides nor issue with the extremists. Rather let us consider at the outset a simple truth—unification is now *LAW*. Like all national laws enacted by Congress and the will of the majority, it must be implemented. Therefore the point of question is no longer whether unification is good or bad, but how best to achieve the true ends for which it was created.

There are many different interpretations as to the true meaning of unification. How it should be accomplished prompts even a wider range of thinking. There is an extremely popular concept which envisions a melting together or fusion of the services. The resulting alloy, they say, would be stronger — would be cheaper to produce — and would have completely different physical properties and therefore no longer resemble any of the metals from which it was derived.

Another unfortunate concept visualizes what we will call the "forging" process. Under this system the services would be heated to brilliance and then pounded together with telling blows of judicial power. I cannot hold with either of these concepts, and in particular if applied to communications.

If we may continue the analogy of metallic processes, I believe that welding would more closely depict true unification. We might consider the three services as individual metal bars or beams of unit strength. If we join these members together by welding struts or cross-braces between them, we form a truss. And if we use an acceptable design pattern in forming the truss, the resultant strength will be greater than that of the three members unjoined. Still more important, this process would retain flexibility and preserve the individual identity of each member. This process is particularly applicable to the communications systems of the three services.

I feel that we should look upon unification as an evolutionary—not revolutionary development. This transition is not limited to the defense establishment alone. The National Security Act, the reports of the Hoover commission and similar legislation and proposals call for a streamlining and realignment of the entire structure of Government. Americans are, by comparison, generally conceded to be open-minded, quick-moving, and efficient as individuals. But collectively, probably because of the degree of freedom they enjoy, they exhibit a profound lethargy and resistance concerning any material change in the processes of their Government.

We can, however, no longer afford to ignore the amazing changes that have taken place in both world affairs and technology. In a relatively short time we have found it necessary to exchange the Monroe Doctrine for the Atlantic Treaty—to consider defense of our homeland in terms of radar screens, intricate air defense systems—and, anti-subversive forces, instead of sole reliance on coastal patrol and "bayonets behind barbed wire on the beaches"—to expand our thinking to accept guided missiles, the atomic bomb and bacteriological warfare as possibilities.

As a nation we have elected to meet these changes and accept the expense—both monetarily and otherwise. Unification will not foot the bill, but if accepted and administered wisely, it may well mean the difference between what we can and cannot afford. For in any future war, we cannot expect victory unless there is already in being the machinery for positive command decisions, unity of agreement on military strategy and a clear-cut delineation of responsibilities.

I believe that even the most service-minded among us will agree that the field of communications is fundamentally "joint" by its very nature. Ever since our departure from the time when wars were classified as being "sea wars" or "land wars," it has been essential that commanders of the services be in communication even though they were operating in widely separated areas. As tactics have de
the present day concept of joint action — air f
force, and sea force all operating in concert—it
necessary to go further and further down the cha
mand in tying together the various echelon comm

In the last war this system of joint connecting
extended from top to bottom and laterally into
command and theatre. The war taught us or reaffi
lessons as well. We found out the meaning of
"time is of the essence." To the old slogan o
message through" had to be added "in the short
We found even during the early part of the wa
must have joint procedures, employ similar metho
common codes.

We also learned that we can no longer stand th
unnecessary duplication and triplication in the co
tions-electronics field. Neither the communication
nor public funds can support un-coordinated dev
procurement and maintenance of similar items
service; particularly such items as radar, micro
tems, single-sideband equipments and navigati
costing hundreds of thousands of dollars in some
for a single installation.

While there is a long road still ahead, I believe
communications can be extremely proud of the str
even before formal establishment of a joint comm
ture. It is significant that when organizing for jo
ties, the Secretary of Defense and the joint chief
fully endorsed the existing structure of the joint
cations board with its several panels which work on
specialized phases of joint communications. Very
this organization was officially designated the join
nications-electronics committee (JCEC), directly
supervision of the joint chiefs of staff. The commi
is composed of a full-time director and the senior
communications officer of the Army, Navy and Air

The office of the director of communications-e
which includes certain assistants equally drawn
three services, was added to the existing structure t
for full-time coordination, expediting and staff wor
will be many controversial issues which the commi
resolve. Delineation of service responsibility for
of communications-electronics equipment — decisi
what separate circuits can be eliminated in favor
mon user facilities; approval or rejection of joint
nications methods and procedures; and resolving
principles and doctrine of joint communication.

And these problems will not be limited to the
sphere. There are some who feel that the militar
operate its communication system efficiently in p
and that it competes unnecessarily with commercia
in the handling of government traffic. Such proble
affect us all must be faced with open minds. Subo
of service or other interests and intelligent analy
follow if we are to achieve a true unity of purpose
derstanding in our field.

The work of the joint and combined commu
boards, the close cooperative spirit that developed du
war years between military and commercial agencies
perpetuation of that spirit in our own Armed For
munications Association—all combine to place us i
viable position of having a strong foundation on
build.

I am confident that we will most assuredly reap w
lieve will prove to be the true benefits of unificatio
omy of operations, not at the expense of, but as a
efficiency. Efficiency of operations through the ado
common methods, procedures and nomenclature—an
a greater effectiveness of operations through a be
derstanding of what constitutes our respective resp
ties. We must accomplish no less than this if w
successfully develop and provide the intricate stru
communications-electronics that future command
require.

Major General H. M. McClelland,
Director, Communications-Electron
Department of Defense

U. S. NAVY

CHIEF STAFF OFFICERS FOR COMMUNICATIONS DURING WORLD WAR II

On this and the following two pages are shown the principal communications activities, with chiefs and deputies, of the three major services during World War II.

Ranks given are those held at the time of command during the World War II period.

CHIEF OF NAVAL COMMUNICATIONS
Rear Admiral C. F. Holden, USN
Rear Admiral Joseph R. Redman, USN

DEPUTY CHIEF OF NAVAL COMMUNICATIONS
Rear Admiral T. B. Inglis, USN
Commodore J. V. Murphy, USN

COMMANDER IN CHIEF U. S. FLEETS (COMMUNICATIONS)
Rear Admiral M. E. Curts, USN
Captain William B. Ammon, USN

COMMANDER IN CHIEF U. S. PACIFIC FLEET (COMMUNICATIONS)
Read Admiral M. E. Curts, USN
Rear Admiral John R. Redman, USN
Rear Admiral Earl E. Stone, USN

MAJOR FLEETS PACIFIC (COMMUNICATIONS)
THIRD FLEET
Captain L. J. Dow, USN
FIFTH FLEET
Captain L. J. Dow, USN
SEVENTH FLEET
Comdr. Leland G. Schaeffer, USN

COMMANDER SOUTH PACIFIC FORCE (COMMUNICATIONS)
Captain L. M. Hardy, USN (Killed in action)
Captain L. J. Dow, USN
Captain S. M. Tucker, USN

COMMANDER AMPHIBIOUS FORCES PACIFIC (COMMUNICATIONS)
Captain C. F. Horne, USN

COMMANDER AMPHIBIOUS FORCES SOUTH PACIFIC (COMMUNICATIONS)
Captain G. W. Welker, USN
Captain J. O. Kinert, USN

COMMANDER SOUTHWEST PACIFIC (COMMUNICATIONS)
Captain James D. L. Grant, USN

COMMANDER SOUTH PACIFIC AREA (COMMUNICATIONS)
Captain C. F. Horne, USN
Captain S. M. Tucker, USN

COMMANDER IN CHIEF U. S. ATLANTIC FLEET (COMMUNICATIONS)
Captain Isaiah Olch, USN
Captain Alfred R. Taylor, USN
Captain E. H. Pierce, USN

MAJOR FLEETS ATLANTIC (COMMUNICATIONS)
FOURTH FLEET
Captain P. R. Kinney, USN

COMMANDER AMPHIBIOUS FORCES ATLANTIC (COMMUNICATIONS)
Captain D. S. Evans, USN
Captain R. E. Elliott, USN

COMMANDER EUROPEAN AREA (COMMUNICATIONS)
Captain John H. Leppert, USN
Captain F. D. Kime, USN
Captain J. A. Morrison, USN

COMMANDER EASTERN SEA FRONTIER CONTINENTAL U. S. (COMMUNICATIONS)
Rear Admiral Earl E. Stone, USN
Captain Jerome Allen, USN
Captain Andrew H. Addoms, USN

COMMANDER WESTERN SEA FRONTIER CONTINENTAL U. S. (COMMUNICATIONS)
Captain A. T. Sprague, Jr., USN
Commodore C. H. Maddox, USN
Captain W. R. Caruthers, USN

Positions are those of the chief of each installation which was commanded by a general officer or which rated such a commander, with incumbents in grade and order of assignment, WW II period.

U. S. ARMY SIGNAL CORPS

COMMUNICATIONS-ELECTRONICS ACTIVITIES AND STAFFS
WORLD WAR II

OFFICE OF THE CHIEF SIGNAL OFFICER, U. S. ARMY
CHIEF SIGNAL OFFICER
Maj. Gen. Dawson Olmstead
Maj. Gen. H. C. Ingles

EUROPEAN AND MEDITERRANEAN THEATERS
SHAEF
Deputy Signal Officer
Maj. Gen. F. H. Lanahan, Jr.

- **ETOUSA**
  Maj. Gen. W. S. Rumbough
- **NATOUSA**
  Allied Force Hq.
  Chief Signal Officer
  Brig. Gen. J. V. Matejka
  Deputy Chief Signal Officer
  Brig. Gen. T. J. Tully
- **MTOUSA**
  Signal Officer
  Brig. Gen. G. I. Back
- **12TH ARMY GROUP**
  Brig. Gen. G. C. Black
- **6TH ARMY GROUP**
  Brig. Gen. Emil Lenzner
- **FIRST ARMY**
  Signal Officer
  Col. Grant Williams
- **THIRD ARMY**
  Signal Officer
  Col. E. F. Hammond
- **FIFTH ARMY**
  Signal Officer
  Brig. Gen. R. B. Moran
- **SEVENTH ARMY**
  Signal Officer
  Brig Gen. George Wooley
- **NINTH ARMY**
  Signal Officer
  Col. J. J. Miller

SOUTHWEST PACIFIC THEATER
Signal Officer, Maj. Gen. Spencer B. Akin
Col. C. H. Arnold (Army Group, SWPA)

- **SIXTH ARMY**
  Signal Officer
  Col. Harry Reichelderfer
- **EIGHTH ARMY**
  Signal Officer
  Col. Rex Corput
- **TENTH ARMY**
  Signal Officer
  Col. Arthur Pulsifer

CHINA BURMA INDIA THEATER
Signal Officer
Brig. Gen. H. L. P. King
Brig. Gen. W. O. Reeder

PACIFIC OCEAN AREAS
Signal Officer
Brig. Gen. C. A. Powell

OFFICE, CHIEF SIGNAL OFFICER
Washington
Deputy Chief Signal Officer
Maj. Gen. J. A. Code, Jr.

- **ARMY COMMUNICATION SERVICE**
  Maj. Gen. Frank Stoner
- **ARMY PICTORIAL SERVICE**
  Col. K. B. Lawton
  Brig. Gen. Lyman Munson
- **ENGINEERING & TECHNICAL SERVICE**
  Maj. Gen. R. B. Colton
  Maj. Gen. G. L. Van Deusen
- **PROCUREMENT & DISTRIBUTION SERVICE**
  Maj. Gen. W. H. Harrison
- **PLANS & OPERATIONS DIVISION**
  Brig. Gen. F. C. Meade
- **CHIEF, PERSONNEL & TRAINING SERVICE**
  Brig. Gen. J. V. Matejka
  Col. F. T. Gillespie
- **ARMY GROUND FORCES**
  Signal Officer
  Col. R. B. Moran
  Brig. Gen. Emil Lenzner
  Col. G. C. Black
  Col. O. K. Sadtler
- **ARMY SECURITY AGENCY**
  Arlington Hall, Va.
  Brig. Gen. W. P. Corderman
- **EASTERN SIGNAL CORPS TRAINING CENTER**
  Fort Monmouth, N. J.
  Commanding General
  Maj. Gen. G. L. Van Deusen
  Brig. Gen. S. H. Sherrill
- **CENTRAL SIGNALS CORPS TRAINING CENTER**
  Camp Crowder, Mo.
  Commanding General
  Brig. Gen. W. S. Rumbough
  Maj. Gen. W. E. Prosser
- **WESTERN SIGNAL CORPS TRAINING CENTER**
  Camp Kohler, Calif.
  Commanding General
  Brig. Gen. S. H. Sherrill
  Col. H. E. Storms
- **SOUTHERN SIGNAL CORPS SCHOOL**
  Col. Hugh Mitchell

U. S. ARMY AIR FORCE

COMMUNICATIONS AND ELECTRONICS ACTIVITIES AND STAFFS
WORLD WAR II

The Air Force's rapid expansion during WW II resulted in frequent changes of command organization. Research has therefore been difficult on this listing and indicates that there will be some disagreement. Comment is invited.

HEADQUARTERS, ARMY AIR FORCES
AIR COMMUNICATIONS OFFICER
Brig. Gen. H. M. McClelland
Brig. Gen. Tom C. Rives, Deputy

SUPREME HEADQUARTERS ALLIED EXPEDITIONARY FORCES
Brig. Gen. A. W. Marriner
Col. Benjamin Stern
Col. Cary J. King

FIRST AIR FORCE
Col. Amory V. Eliot
Col. James F. McGraw
Col. Paul S. Edwards

EASTERN SIGNAL AVIATION UNIT TRAINING CENTER
LANGLEY FIELD, VA.

FAR EAST AIR FORCE
Col. Alvin L. Pachynski

FIFTH AIR FORCE
Col. James B. Bestic
Col. James C. Van Ingen
Col. Thos. L. Bryan

THIRTEENTH AIR FORCE
Col. Gus B. Hoffman
Lt. Col. W. W. Bailey

SECOND AIR FORCE
Col. Daniel B. White
Col. John C. Grable

ANTILLES AIR COMMAND
Col. Howard W. Serig

SIXTH AIR FORCE
Col. A. J. Mandelbaum
Col. Wm. M. Talbot

THIRD AIR FORCE
Col. Roland O. S. Akre
Col. Hammer Houston

AIRCRAFT WARNING (RADAR) UNIT TRAINING CENTER
DREW FIELD, FLORIDA
Col. Benjamin Stern
Brig. Gen. S. H. Sherrill

ARMY AIR FORCES PACIFIC OCEAN AREA
Brig. Gen. F. L. Ankenbrandt

SEVENTH AIR FORCE
Col. John A. McDavid
Lt. Col. Wm. Peindel

TWENTIETH AIR FORCE
Col. Albert T. Wilson
Col. George Metcalf
Col. Samuel Lamb

FOURTH AIR FORCE
Col. David C. G. Schlenker
Lt. Col. Orville Laird
Col. Robert F. Frost

U. S. STRATEGIC AIR FORCE
Col. George P. Dixon
Col. Raymond C. Maude

EIGHTH AIR FORCE
Col. Allan F. Sullivan
Col. E. Blair Garland

NINTH AIR FORCE
Col. T. J. Cody

WESTERN SIGNAL AVIATION UNIT TRAINING CENTER
PINEDALE, CALIF.
Col. D. C. Schlenker

CHINA-BURMA-INDIA-THEATER
Col. Edwin R. Petzing
Col. Wm. H. Knowles

TENTH AIR FORCE
Col. Walter A. Simpson
Col. Walter B. Larew

ARMY AIRWAYS COMMUNICATIONS SYSTEM
Col. Lloyd Watnee
Col. Ivan L. Farman
Col. W. W. Bowman

ALASKAN AIR COMMAND
Col. Haskell E. Neal

ELEVENTH AIR FORCE
Lt. Col. R. J. Carlgren

AIR SERVICE COMMAND
Col. H. R. Yeager
Col. Daniel C. Doubleday
Col. Leon W. Richmond

MEDITERRANEAN ALLIED AIR FORCE
Col. Draper F. Henry
Brig. Gen. A. W. Marriner

TWELFTH AIR FORCE
Col. Dudley D. Hale
Col. Bruce H. Perry

FIFTEENTH AIR FORCE
Col. James K. DeArmond

WATSON LABS
Col. Oscar C. Maier

AIR TRANSPORT COMMAND
Lt. Col. W. D. Inness

SOUTHEAST ASIA COMMAND
Col. Harold W. Grant

FOURTEENTH AIR FORCE
Lt. Col. John M. Williams
Lt. Col. Ernest C. Wood

WESTERN UNION
Telegraph Company Operation

Message operations of Western Union, throughout the United States, are handled on an intercontinental network through fifteen relay centers. The system permits connections from any one center to reach a connection from any other center by way of automatic and reperforator switching methods with a maximum of two relays for any message transmitted. The application of this system can be made effective almost immediately in a war emergency.

The Western Union Telegraph Company problem is to provide an accurate, fast and dependable telegraph service to the general public at a reasonable price to yield a fair margin of profit.

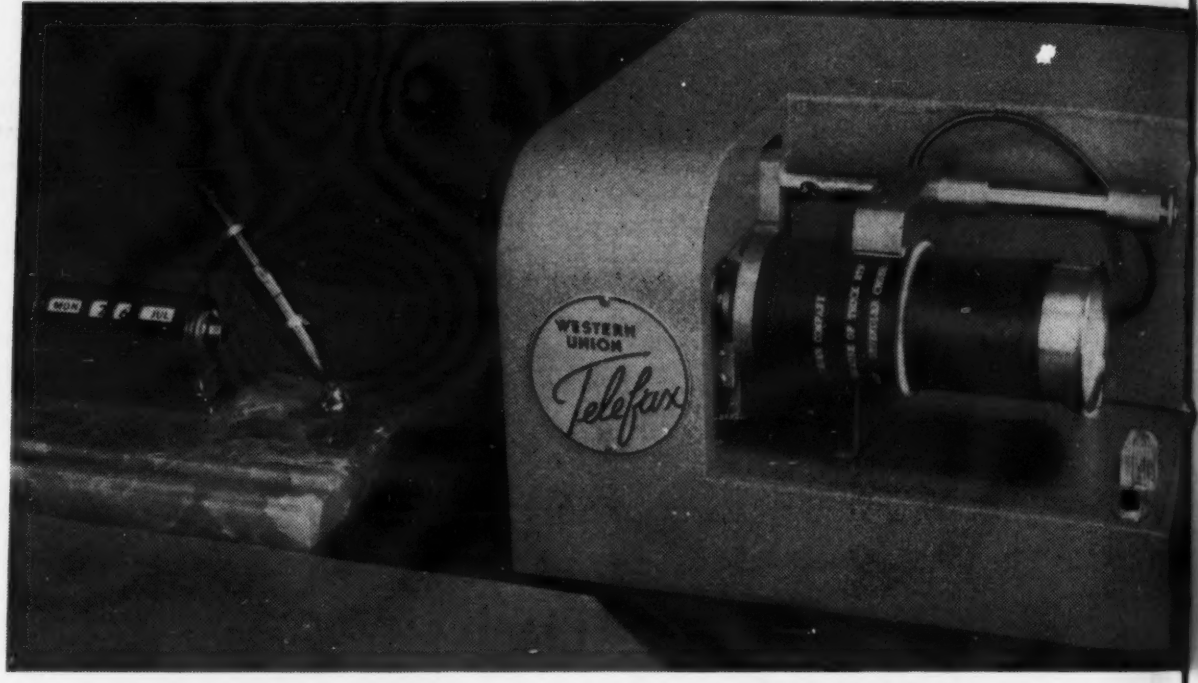
When we consider the geographical magnitude of the United States and its large population, the scope of the task assumes major proportions. To meet this challenge over the past 98 years, Western Union has endeavored to keep abreast of the communications art as well as the demand of the business users and the general public for adequate service to maintain the increasing tempo of industrial and social activity.

In its early days the erection of pole lines and wires kept abreast of railroad expansion and the Morse key and sounder provided the electrical transmission to initiate and interpret the interchange of words.

Beginning with the advent of the 20th Century, mechanical or printer telegraphy made its appearance as an answer to the increasing demand for greater capacity without the expensive construction of additional pole lines and wires. The synchronous multiplex was brought to its peak development by Western Union engineers and applied successfuly on transcontinental and other routes to provide the needed capacity. Various manufacturers assisted in this development and furnished the units of equipment required.

Under this multiplex system which is still in operation in Western Union, four messages can be simultaneously transmitted and received on one physical wire. During the period 1910 to 1930 Western Union installed this equipment on all its major trunk routes.

The multiplex system, briefly, is a means of transmitting and receiving electrical impulses of either polarity through the medium of synchronously driven brushes rotating over segmented face plates. The Baudot character code is used in which a combination of five pulses sets up each character and, through the medium of a tape perforator and transmitter, the proper selection is initiated and transmitted to the segments on the face plates.



Western Union is engaged in a large expansion of "Desk-fax" (facsimile) for sending and receiving messages right on the office desk.

In four-channel multiplex the face plate is divided into quadrants each having five segments to correspond to the code. At the receiving end the pulses are taken from the receiving face plate and transmitted into the five selecting magnets of a multiplex printer which interprets the code and prints the corresponding character.

To meet the requirement for printer telegraphy on a simple and less costly basis than multiplex, for interchange primarily between the trunk relay office and its surrounding branch and tributary offices, the "simplex" or start-stop printer was developed. This machine, at present named the teleprinter or teletypewriter, is a self-synchronizing printer, rugged in construction and simple in its electrical elements. Perhaps its major contribution to Western Union was the simplicity of operation, in essence a typewriter keyboard, which obviated the need of trained Morse operators and at the same time provided two-fold capacity on the same physical wire while increasing speed and accuracy.

Collateral with increasing service demands the size of Western Union relay or central offices grew to the extent that the physical handling within the office between the receiving positions and the outgoing positions developed into large proportions. In these offices messages were received by teleprinter and pneumatic tube from branch offices and adjacent tributary offices; by teleprinter from direct-connected tie lines; by multiplex printer on the incoming trunk circuits; over the public telephone at typewriter recording positions, and, to a small extent, by Morse from railroad offices.

To handle this interchange of many thousands of telegrams speedily, economically and without loss, Western Union engineers designed and installed planned layouts incorporating message conveyors for the pick-up, routing and distribution of telegrams throughout the various floors in which the central office was housed. Each receiving position was located adjacent to a table conveyor in which the receiving operators deposited incoming messages. These conveyors discharged into common pick-up conveyors which converged into message routing centers.

At these centers trained routing clerks would scan the destination of each message and after consultation

Fig. 1

with the proper routing charts would indicate on the message the proper outbound circuit to which the message should be consigned. After having made such notation the routing clerk would deposit the message on the proper conveyor leading to the geographical location in which the particular outbound circuit was positioned. These routing clerks required appreciable training and constant vigilance to keep abreast of the proper selection of outbound circuits to meet each individual destination.

From these routing centers the delivery conveyors carried the telegrams to the designated areas where they were deposited on sub-routing center tables for sorting by circuit designations. From these points route aides, generally boys and girls on roller skates, would carry each message to its proper transmitting position. (See Fig. 1, central office, and Fig. 2.)

Tube Carriers

The above brief description should readily indicate the plant and the personnel required merely to handle the transfer of telegrams from receiving positions to sending positions and with it the appreciable amount of time consumed in effecting such interchange.

To insure against loss in the conveyor system, belt conveyor inspectors were assigned to make continuous inspections of the conveyor system and to shut down each conveyor at frequent intervals to make certain that no message had become fouled within it. Problems of static and the hazard of tearing these pieces of paper as they traveled on and between floors were of real magnitude demanding constant refinement of engineering design and vigilance in operation.

To increase efficiency in the transfer of telegrams between the central office and the larger branch offices in the city in which the central office is located, Western Union undertook, in the period up to 1939, the installation of 2¼" ID underground copper tubes in the streets through which fiber carriers containing messages were transmitted on a pressure vacuum circulating loop. In the larger cities the amount of this interchange led to the design of compressor plants, manifold distribution and automatic sending and receiving inlets and terminals to handle the pneumatic tube carriers.

Reperforator Developed, 1937

It can readily be seen that this manual method of receiving and transmitting telegrams from branch and tributary offices involved large expenditures and the delay involved in tube transit of telegrams. In addition to this so-called terminal pick-up and delivery in and out of the central office there was posed the equivalent problem of providing adequate trunk circuits to carry the messages to the distant locations.

With the relatively small countrywide circuit network built up on physical wires on pole lines it was necessary to concentrate loads between the central offices in order to effect maximum use of the interconnecting circuit, and this resulted in adding intermediate relays between origin and destination with attendant expense and delay. To reduce the number of such relays would have required a plenitude of circuits and this factor in overall Western Union operations became an important part of its current mechanization program.

With a view toward minimizing the time drag in relaying the message in the central office and reducing operating cost, Western Union developed the "reperforator" method in 1937 in an installation in the Richmond, Va., office. Briefly, this method involved first the reception of messages on combination printer-perforators, which simultaneously printed the characters and punched the corresponding 5-unit code combinations in the same tape. This tape from each printer-perforator ran in a continuous strip into an adjacent 5-unit switching transmitter, electrically connected to a 9-conductor cord and plug.

System Expanded

Secondly, all out-bound circuits were set up in a 9-conductor jack switchboard. As each message was received, the operator would glance at the preamble to determine the routing and then insert the associated transmitter plug into the switchboard jack corresponding to the destination of that particular message. This operation would be repeated for each received message. The insertion of the plug into the jack started the transmitter stepping the tape ahead and it would continue until the end of message signal, consisting of two periods, was reached. The message was transmitted electrically to a storage reperforator at the proper sending position where it would be perforated in another tape, along with a message number automatically inserted at the head, to wait its turn for transmission over the out-going circuit to the desired trunk, tributary, or branch or local destination.

To prevent accumulation of tape at these receiving positions on incoming circuits operating at 65 words per minute the switching transmitter was operated at a speed of 150 words per minute in the cross-office circuit feeding the storage reperforator. The interval of time gained between these two speeds provided sufficient time for the switching operation.

The trial installation in the Richmond office in 1937 proved very satisfactory and the same method was expanded through 1945 to Atlanta, Dallas, St. Louis and Oakland. More installations would have been made but for the fact that during the war period the necessary materials were not available.

Fig. 2

The steps outlined above were made on the basis of the then-existing circuit layout and replaced the manual with a reperforator relay in the larger central offices named to improve service and reduce operating costs.

FM Carrier Systems

With the advent of the merger of Western Union and Postal Telegraph Companies, an overall planned program was initiated to provide for a network of reperforator relay offices through which all relay messages would transit. Included in this program was the complete establishment of all trunk and major tributary circuits on a carrier basis operating on voice-frequency bands in lieu of maintaining DC operation on physical wires over existing pole lines. This carrier development superimposed steps of defined frequencies on a pair of wires with each frequency a transmission medium, its width determining the capacity.

At present Western Union has in service two distinct types of frequency modulated carrier systems built around a voice band frequency of approximately 3,000 cycles, one system providing 9 carrier channels, each capable of supporting a 4-channel multiplex circuit, and the other an 18-channel carrier system, each supporting a single teleprinter circuit. The wide carrier channel has a band width of 300 cycles, the narrow, 150 cycles.

Fig. 3

Western Union operates its entire trunk plant on a carrier basis, some wide-band but the larger part by far on a narrow-band basis. The ultimate layout will provide a complete narrow-band carrier network operating single-channel teleprinter circuits exclusively to provide a homogeneous and flexible network and permit circuit connections between any two Western Union offices as desired.

Beginning in 1946 this program was refined to take advantage of further improvements in automatic methods for relaying message traffic. Included in this program was a large increase in trunk circuit mileage to insure completely adequate circuits and the elimination of previous complicated routings and attendant intermediate relays. The complete trunk circuit distribution was rearranged on the basis of 15 geographical areas each served by one reperforator office. All telegraph offices in an individual area were terminated in the reperforator relay office and an adequate number of trunk circuits provided to interconnect these relay centers and carry the load with minimum delay.

The Western Union system now comprises 14 reperforator switching relay centers with the 15th, Portland, under way. Of these, 10 provide for automatic selection of out-bound trunk and tributary circuits. The installation in Boston is of this latter automatic type and a brief description of its operating method will indicate the improvement in service and operating expense over previous installations.

Fig. 4

Automatic Operation

Messages are prepared by the initiating operator on a cadence keyboard perforator (Fig. 3). A preamble of 11 characters is required, the first two giving the call letters of the trunk office to be selected and the subsequent characters indicating the office of origin and the message number. The selecting characters are received in the main office and interpreted automatically to connect a storage reperforator operating on the outbound circuit called for by the selecting characters. (Fig. 4). When this connection is made the transmitter in the outer office sends the succeeding preamble characters which are immediately compared automatically for accuracy particularly in the message number. (Fig. 5).

If the message number is correct in that it is the correct number following the preceding message number then the initiating office transmitter is permitted to start and transmit the message which has been perforated. No manual time is involved in the main office and the message frequently is delivered within the digit minute in the distant relay office serving the city of destination.

To assist the operator in determining the proper relay office for the destination in each message, a map is provided to show the 15 geographical areas, each area including a number of complete states. It is, therefore, a simple matter for the initiating operator knowing the state of destination to select the relay office which serves it.

For example, if a message initiating in the city of Boston or in any of its tributary offices is destined for an office in the state of Nebraska, the originating operator can quickly check that Kansas City (=K) is the relay office which handles the state and type the characters "=K" as the code for selecting the proper trunk connection. In the Kansas City office the message is received on a printer-perforator assigned to the incoming Boston channel and "switched" by the attendant operator to the named tributary office in Nebraska.

Push-button Switching

In the Kansas City office and other offices, installed between 1946 and 1949, the equipment provided for "switching" to tributary offices within the area differs from the "plug and jack" method previously described. The cords and jacks have been replaced by push-buttons, so that all the switching operators have to do is to push the right button to transmit each successive message on its way. The pressing of a push-button sets up a train of connections which when completed starts the transmitter and initiates transmission at 125 words per minute to the storage reperforator associated with the destination selected.

Fig. 6

Included in the series of operations is the insertion of an automatic numbering machine (Fig. 6) to send the proper number sequence at the head of each message and prior to the start of transmission from the switching transmitter. In the equipment at these new reperforator offices provision is made for automatically adding time and date to messages leaving the reperforator center.

At the completion of the intelligence transmission the line circuit is momentarily transferred from the line transmitter to a time and date rack where the necessary coded pulses are initiated and transmitted to the out-station printer to furnish the exact time and date of such transmission.

These developments were introduced by Western Union engineers in connection with reperforator switching operation and are being applied also to patron leased switching networks. The improvement in message speed of service and operating economies are readily apparent.

Desk-fax

To make its service more convenient and attractive to users and to improve the speed of pick-up and delivery of messages the Company is engaged in a large expansion of facsimile, or desk-fax operation. (See photo, page 12.)

The desk-fax is a small compact unit not much larger than the telephone set, which can be mounted on the user's desk. With this machine a patron can write or type his message on special Western Union blanks provided for the purpose, place the blank on the drum of the desk-fax and press a button to complete transmission into the Western Union office. Corresponding apparatus in the telegraph office receives a facsimile copy of the message transmitted.

A similar transmission from the Western Union main office to the patron provides for delivery of incoming messages on the same machine. This means of pick-up and delivery replaces the intermediate branch office and messenger handling now existent and thus provides an improved service simple in the extreme to use.

System Ready for Emergency

Western Union also initiated in 1946 a microwave triangle interconnecting New York, Pittsburgh and Washington to provide for 8 voice bands in each direction between these three cities. This triangle is now in traffic operation and demonstrating the value of radio beam as a transmission medium.

From the above it can readily be seen that Western Union message operations throughout the United States are handled on an interconnected network through 15 relay centers which permit connections from any one center to reach a connection from any other center via automatic and reperforator

Fig. 5

switching methods quickly and accurately and with a maximum of two relays for any message transmitted.

With a system of this type its application in a war emergency can be made effective almost immediately. Government offices throughout the United States can be directly connected to any one of these 15 relay offices by providing the terminal apparatus in the Government office and the connecting circuit to the relay office. Nothing more need be done with the use of routing indicators now in service particularly in the armed forces communication network; messages can flow through the Western Union relay network speedily and accurately.

A simple chart showing the states served by each relay center will permit initiating Government operators to indicate the proper selecting characters to reach the office of destination and by maintaining the current practice of message numbers in proper sequence so essential to insuring against loss, it can be readily perceived that any training or supervision required to integrate Government operations into the Western Union network is negligible both in time and effort.

It is of vital importance in the national interest that Western Union's modern, flexible network be maintained at peak efficiency at all times for the swift, accurate movement of industrial and social communications. That national interest, of course, becomes even more impelling in time of war or other emergency.

The fullest possible use of Western Union's network by the various governmental agencies will have the three-fold advantages of assisting to maintain that network at peak efficiency, of providing economies in communication costs to the Government, and of permitting immediate expansion in time of emergency.

INSHORE NAVIGATION with RADAR and VPR

By Captain William Hugh Organ, USN

During the night of July 27, 1948, the U.S.S. *Marias*, a Naval Transportation Service tanker, steamed down Cook Inlet, en route from Anchorage, Alaska, to San Francisco, California. Visibility was poor, the shore rarely being in sight. Navigational aids were scarce. The channel ranged in width from a few hundred yards to several miles. Currents were variable both in direction and strength. The ship's gyro compass had a six degree westerly error. Visual bearings were taken as opportunity presented but in themselves were totally inadequate for piloting purposes. The fathometer was operating satisfactorily, but it yielded very little information as to the ship's position. In spite of all these adverse conditions, standard speed of sixteen knots was maintained with perfect safety.

In the above situation the commanding officer was using neither "potato" nor "barking dog" methods of piloting. He was not equipped with a crystal ball nor was he endowed with occult faculties. Actually he was piloting by radar and an associated device known as the VPR. The confidence which he placed in this equipment was based on considerable experience with it.

Radar Employment

The use of radar for navigational purposes has two general aspects, its offshore use and its inshore use. In its offshore or open seas employment the radar is essentially a warning device and an aid in determining the position and movements of other craft or objects under low visibility conditions. In its inshore employment the radar serves not only the foregoing purposes but also provides the information by means of which the ship may be safely piloted along the coast, clear of rocks and shoals and in and out of bays and harbors.

The land bounding any body of water may be visualized as consisting of thousands of minute areas, each capable of acting as a reflecting surface for the electromagnetic waves produced by a radar transmitter. The intersection of the radar bearings and the focus of the radar ranges of all these tiny reflecting surfaces will be a single point which marks the position of the transmitter and thereby fixes the position of the ship. A radar fix thus obtained is in no way dependent upon artificial features ashore such as lighthouses, beacons, structures, or electronic aids. By taking advantage of this characteristic of radar, which requires only the shore's natural topographic features for position determination, any bay, harbor, channel, or other restricted body of water, regardless of the presence or absence of the usual navigational aids on shore, is potentially navigable under all visibility conditions.

Finding Position by Radar

The navigator has the following methods at his disposal for determining the ship's position by means of radar: (a) he may strike range arcs from a number of known points on shore; (b) he may plot the ranges and bearings of one or more known points; (c) he may plot the radar bearings of two or more points; or, (d) he may match a chart of the area with the radar pattern on the scope.

In the first three methods (a, b, and c) or any combination of them, the navigator frequently finds it difficult and time-consuming to identify echoes. In contrast, by the last method (d) he can identify all echoes almost instantly. In addition to being a faster method of determining the ship's position, the chart matching method is inherently more accurate for, in effect, it makes use of an infinite number of reference points.

There are several methods of chart matching. One of the simplest is to use the Virtual PPI Reflectoscope, referred to as the VPR. The VPR is an optical device which fits over the PPI scope of a radar or radar repeater. Its principal elements are a set of reflecting mirrors, a chart holder, and a viewing hood. Looking in the viewing hood, the navigator sees the chart which he has placed on the chart holder and, superimposed on the chart, he sees the virtual image of the PPI scope, formed there by the reflecting mirrors. By moving the chart he can match the tracing of the shoreline with the virtual image of the PPI scope pattern.

VPR charts are constructed on blanks made of translucent plastic, coated with black wax. The wax coating may be cut easily by a tracing point, and, where cut, will pass light.

The VPR chart holder is a flat glass surface and has a rheostat controlled light beneath it. Varying the intensity of the light outlines the tracing in different degrees of brightness.

VPR chart preparation is simple. A tracing of the desired shore line is made on a wax coated blank, using any of the scales on which the radar operates. Tracing and scale reductions or enlargements are accomplished by means of a pantograph and a Hydrographic Office chart of the area. The tracing should not contain more detail than is necessary for matching and piloting purposes. Some of the more important elements to include are: a few major contour lines, mountain peaks, high bluffs, groups of buildings, low areas, ten fathom curve, shoal spots, buoys, lightships, obstructions, wrecks, etc. A few latitude and longitude lines add to the value of the chart tracing. The desired course entering or leaving port should be laid down on the H.O. chart and should be duplicated carefully on the VPR chart.

Although VPR chart preparation is simple it places an extra responsibility upon the commanding officer. He must ensure that the portions traced are accurate scale reproductions of the corresponding parts of the H.O. charts. He must take particular care to see that underwater hazards are entered and placed accurately.

The operation of the VPR might be best illustrated by a hypothetical case. Assume that a VPR equipped ship is approaching San Francisco Bay at fifteen knots from the southwest. The weather is foggy. At sixty miles out her radar picks up a few land echoes. Her navigator cannot positively identify any of them but he suspects they are peaks lying to the north and to the south of San Francisco. Having prepared a VPR chart tracing for use on the eighty mile scale, he places it in the chart holder of the VPR, which has been placed on the bridge radar repeater, turns on the light beneath the chart and looks through the viewing hood. Finding the tracing a little too bright, he dims the light. On this chart, which is a long range one, he has taken pains to enter the more prominent peaks and ranges. He moves the chart around, trying the peaks in various positions beneath the virtual image of the echoes until they appear to satisfy the configuration on the scope. He notes that the longitude lines on his chart, as he has oriented it, run approximately in a true north-south direction, tending to verify the correctness of his chart matching. He concludes that the posi-

Courtesy: U. S. Naval Institute Proceedings.

tion he has obtained is about three miles south of the approach track.

Next, he takes a range to a reference point on the VPR chart by means of the range circles on the scope, rotates the bearing cursor till it lines up with the same point, and reads the true bearing on the scope's gyro repeater. Using the range and bearing thus obtained, he plots the ship's position on the large scale H.O. chart in the chart house. Fifteen minutes later he again matches his VPR chart and this time notes that his position is about one mile south of the track. During the next hour he takes a number of positions with the VPR and transfers them to the large scale chart. Fairing his track through these points, he finds that his mean track lies about two miles south of the approach track and about one degree to the left of it. Although this course deviation may be due either to a gyro error or to currents, he suspects the former, as charts of the area indicate southerly currents of about half a knot. He recommends a temporary course change to the left to put the ship on the approach track. The change is made and base course resumed upon reaching the track.

Position Clearly Shown

The ship is now about forty miles out from the entrance and land echoes are becoming stronger and more extensive. The radar operator reports that he believes he has a ship on the port bow distant about eighteen miles. The navigator checks the repeater scope on the bridge and sees the same echo. However, with the VPR chart matched, the echo conforms to the position of South Farallon Island. This identification is confirmed by subsequent data.

The navigator now notes that in positioning his chart the longitude lines show a consistent offset of one or two degrees to the left of north. This appears to confirm the westerly gyro error suspected earlier. If there is no gyro error, and the chart has been correctly matched, the longitude lines will lie in a true north-south position. The navigator informs the captain of the gyro error and recommends steering a gyro course one degree to the right of the base course. The captain orders the change made.

When land echoes begin to appear on the twenty mile range scale, the navigator replaces his eighty mile VPR chart with one constructed for use on the twenty mile scale. The lightship is now plainly visible on the radar screen, and on its present course the ship will pass it about one half mile to port.

The captain comes over to the repeater to take a look at the PPI scope. The light beneath the chart is off and he sees only the virtual image of the pattern on the scope which appears to him as just a mass of echoes. He turns up the light beneath the chart and the tracing of the shore line becomes visible. As the chart had been matched

---

A graduate of the Naval Academy and of the post graduate course in radio engineering, Captain Organ performed communication duties in the Asiatic Fleet from 1937 to 1940. His war-time assignments included officer-in-charge radio installation, Bureau of Ships; navigator, U.S.S. "Honolulu"; radio officer CinCPac Staff; executive officer, U.S.S. "Indiana." Subsequently he has served as special assistant to the head of the electronics division, Bureau of Ships; electronic officer, Naval Shipyard, Long Beach; and commanding officer, U.S.S. "Marias." At present he is assigned to the Office of the Chief of Naval Operations.

---

a few minutes before, the echoes from the land now become recognizable under the tracing. What had been a confusing pattern to him just a moment before is now a well defined picture which gives him a clear idea of the ship's position with respect to the lightship and the shore. He sees some rather large but faint echoes not enclosed by any of the shore lines. He asks the navigator about them, and the navigator replies that he believes they are side lobe returns. The navigator asks the operator to turn down the gain. With the gain turned down, the faint echoes disappear, which confirms the navigator's belief.

The radar operator again turns up his gain and reports two ship contacts, one at about eight miles standing out of San Francisco harbor and another dead ahead at about two miles. The latter contact he believes to be a small craft because of the weakness of the return and the range at which it was picked up. The navigator, checking the VPR, verifies them as probable ship contacts.

The captain orders speed reduced to five knots and maneuvers the ship up to the vicinity of the lightship and makes the signal for a pilot. A pilot vessel soon appears out of the fog and the pilot is taken aboard.

To Anchorage by VPR

The navigator and the pilot concur on the course to be steered to the outer channel entrance buoy and the ship proceeds slowly through the fog along the designated course. The earlier ship contacts are reported by the navigator as no longer being potential dangers.

The navigator now replaces the twenty mile scale with a ten mile scale chart. He sees that side lobe returns are clouding the scope rather badly and has the operator turn down the gain. This makes it easier for him to match his chart. He advises the captain that the ship appears to be checking along the track.

The operator reports a new echo near Alcatraz Island. With the aid of the VPR the navigator observes that it is not a part of the shore line nor a fixed object. He tracks it and reports it to the captain as a large vessel standing out which probably would be passed in the vicinity of Golden Gate bridge. The captain, after discussion with the pilot, decides to stop and wait for the outbound ship to pass through the Gate and steady on its new course. The navigator tracks the ship through the Gate and reports that it is apparently headed for the outer channel and should pass clear to port at about three hundred yards. The captain gives the order to go ahead at five knots.

After passing under the bridge the navigator replaces the ten mile scale VPR chart with a four mile scale chart. He concurs with the pilot on the course to the designated berth in the quarantine anchorage.

The captain advises the pilot he will anchor using radar bearings. He directs the navigator to furnish him the necessary information for anchoring.

The navigator plots the progress of the ship, using VPR data, and keeps the captain advised accordingly. When in position the captain anchors the ship.

The foregoing imaginary approach, while not exhausting the possibilities of the VPR as a navigating tool, does illustrate many of its most useful applications.

Advantage Summary

The advantages of VPR navigation may be summed up as follows:

(1) It is simple. In essence it only requires of the operator the ability to superimpose one image upon another.

(2) It is accuarte. It meets all normal piloting demands for accuracy.

(3) It is rapid. Matching chart and image takes only a few seconds.

(4) It is clarifying. It instantly resolves the mass of echoes in the vicinity of land into easily identifiable areas. It also assists in identifying ships in the proximity of land.

(5) It is self-sufficient. It requires no artificial aids ashore.

(6) It has long range characteristics. Under certain conditions fairly accurate piloting is possible at distances in excess of sixty miles from land.

We appear today to be going through a period of change in our low visibility piloting methods. Electronic developments are making possible means of piloting which are rapid, accurate, and reliable. Just what trend these developments will take would be very difficult to predict. Developments resulting in a standardized system of world-wide electronic piloting aids would be very desirable. However, such a system would probably be very difficult to establish because of the necessity for all nations agreeing on a common system. Arriving at such an agreement would be a laborious task and one which would not be made any easier by the demands of competing industrial concerns within the countries themselves.

While awaiting this era of "push-button" piloting, the use of VPR in conjunction with radar is recommended as a very satisfactory interim method. With a radar, a VPR, and a set of charts, the navigable waters of the world are truly your oyster.

Security of Communications

By Capt. Charles C. Robinson

Chief, Transmission Security Division, Hq. Airways & Air Communications Service

Capt. Charles C. Robinson, USAF

In any future war, security of our communications well may mean the difference between victory and defeat. Therefore, it is incumbent upon us to study, analyze, develop and improve our present communications concepts. Today, qualitative superiority in communications is more vital to ultimate success than at any other time in our history.

Of itself the word *communications* is a broad general term. To a dozen different people it may have a dozen different meanings. All may be accurate —but only partially so.

Exactly what are communications? What do they mean to a military commander? And what are military communications?

First, one definition of communications might be "a system for the transfer of information from the *mind* of one person to the *mind* of another person." Mere transmittal of a message from one person to another, or from one message center to another may be communications *per se;* but communications of this type have not accomplished their purpose. Such communications are negative communications.

Basically, the success of communications depends upon the transfer of *information* from the mind of one person to the mind of another with accuracy and speed and security.

Second, communications are the nerve system of the military being. Similar to the system of the human body, communications warn of danger, announce opportunity, ask for nourishment, and order action. Thus, communications are everywhere: in the bellies of tanks, in the fuselages of planes, in ships' radio shacks and in the minds of men.

Third, communications are the extension of the will and being of a commander. Through them he can control greater masses of *force* and *space* in less time. By controlling force, space and time he increases the possibility of victory.

Communications today are so vital to the commander that he must know their certainty, functioning, capacity, speed and security as well as he does the capabilities of his troops and tanks, planes and howitzers.

In addition, a commander must be able to acclimate himself to the constantly changing conditions of *joint* (Army, Navy and Air Force), and *combined* (operations wtih allies) communications at a moment's notice.

Lastly, communications has kept pace with other advancements of warfare and has become more than a matter of "getting the message through." Equally important now are security, intelligence and countermeasures, including jamming.

Military and civil communications in peacetime stress speed and accuracy of delivery. Similarly, these conditions are stressed in wartime, but to them is added another qualification: security. A commander must know not only that his messages get through, but he also must know to what extent his messages get through to enemy headquarters.

Security is the factor which has been added by war. Let's look, then, at some of the aspects of communications security.

Lack of security detracts from a commander's initiative; loses for him the advantageous element of surprise. Without security, a commander himself may be surprised and his operation countered by the enemy. He even might never know that his own communications insecurity was the cause of his stalemate or defeat.

Vital Importance Cited

The vital importance of communications security to operations cannot be overstressed. In fact, security is an absolutely necessary factor of successful command. I cite here a few examples to prove that point.

In January, 1915, certain German naval radio messages were heard in England. The texts were read in the Admiralty. All data were plotted on a chart of the North Sea.

That night the British fleet set out to sea to be at a designated spot at 0700 the next morning. Within a few minutes of the appointed time, a superior British force intercepted four German battle cruisers and sank one. As a result, the Kaiser drastically restricted the operations of the High Seas Fleet and within eight days appointed a new commander-in-chief for the fleet.

Another example of communications insecurity also deals with German naval radio messages.

Besides many encrypted ones, one happened to be in plain German to all ships for the warrant officers' messes, cancelling a beer party two days hence. Before the German ships left their docks, a superior British force was ordered to sea to meet them at a designated rendezvous. At that designated rendezvous was fought the famed Battle of Jutland.

Why was such carelessness permitted within a command supposedly as alert as the German Navy? Could these things happen today? To us?

They could.

In the two cited cases, the Germans neither understood nor used safety rules for radio. They used radio inside a Navy yard to send orders to ships lying in their docks. They wanted radio messages to get through to addresses. The messages did get through to the addresses, but also they got through to the British all the way to the Admiralty offices in London.

How was this accomplished? OB 40 did it.

WW I Radio Intelligence

OB 40 was a section of the Admiralty housed in Old Building Room 40. In those early days of radio it cloaked its findings behind the blind of radio direction finding—which it also really did use. But OB's 1500 employees also preyed upon the *insecurity* of German naval communications.

OB 40 listened to the chit-chat of U-boat radio men each night as they charged batteries on the surface. With the aid of direction finders and names of operators and their girls gained from radio gossip sessions, OB 40 located and identified each U-boat and estimated how far it could travel in the time when convoys would pass through those waters.

All that remained for the Admiralty to do was to route convoys which U-boats could not reach in the time they had to run.

On the Eastern front during World War I a Col. Max Ronge, chief of the Austrian intelligence service, gathered information for Marshal von Hindenburg. Although his legitimate duties embodied only the fields of espionage and prisoner questioning, he added of his own accord: (1) listening to enemy radio; (2) listening to enemy telephones; (3) locating and tracing the movement of enemy radio stations by DF. His extra curricular activities paid off.

Russians' Laxness, WW I

Nightly, between 9 and 10 o'clock, the Russians radioed orders to their troops for the next day. A few hours later these orders were laid down before von Hindenburg and Ludendorff. They in turn issued orders for their own German troops based on foreknowledge of the enemy's plans.

Once more the question might be asked: why could the Russians be so careless as to permit transmissions by radio of vitally important battle orders? Well—radio was new. It was convenient. Moreover, the dispatches were in cipher and thus secure. Why *not* use radio?

At first the Russians suspected that German air reconnaissance was responsible for their reverses. Discarding that theory, they then examined their codes and substituted superior ones. But even then they were guilty of flouting communications security laws. Imperfectly trained communications men in the field were not always equal to the complexity of the new codes, and they compromised the new code by misuse and frequent requests for repeats in the old codes.

Thus we come to the conclusion that the Russian commanders were totally lacking in security orientation.

German Staff Incredulous

It is interesting to note that when Col. Ronge first offered his information to the German general staff, it was neither accepted nor believed. The German staff naturally assumed the Russians were trying to deceive them by using plain or weak codes. Moreover, never before had information been gleaned from listening to enemy radio circuits.

Taking advantage of an enemy's weakness is a basic concept of war. Ronge merely applied an elementary military principle in connection with a communications concept. Theretofore, taking advantage of radio insecurity hadn't been written "in the books."

Ronge's information by radio soon convinced the German staff that it was absolutely accurate and far more timely than that received by agents. Furthermore, it was almost instantly received at headquarters without risk or cost of life. Indeed, it was almost a foolproof method of garnering information about the enemy order of battle.

Capt. Charles Clark Robinson graduated from Fordham University in 1939. Enlisting in the Army in February 1942, he was immediately sent to the Signal Corps OCS at Fort Monmouth, N. J. Upon graduation he was assigned to the 350th Signal Company, serving thereafter in the South Pacific theater. His colorful career both in battle and communications is attested by the six battle stars he is entitled to wear and the position he holds today at AACS headquarters.

So far our examples were taken from the first world war. Certainly, a consensus of opinion would be that security violations such as the foregoing would not be repeated. But they were.

Let us now examine World War II examples of communications security and insecurity and their effect upon tactical operations.

The following is a case that, were it not for its seriousness and importance, would be a comedy of errors.

A British message in the Middle East was intercepted by Germans who broke, read, encrypted and sent the text to their own forces by radio. The British in turn intercepted this text, broke read, and recognized it as their own British message. All this within 24 hours.

Rommel Alert to Radio Use

Over in Africa, Gen. Rommel is said to have read freely practically all Allied radio messages in the earlier part of the African campaign. One AAF officer reported that on one occasion the Germans used 40 per cent of their radio men to monitor the other 60 per cent to insure their own security. Rommel was organized to work on tactical communications. He even took direction finder bearings on spark plugs in motor vehicles. Such was the communications-consciousness of this commander.

In World War II communications carelessness caused the Allies no little trouble. For instance, a Noumea radio operator after sending off numerous encrypted dispatches ordering a certain operation, sent in plain language, ". . . and the old man will be up in 3 days." The "old man" in this case was Admiral Halsey. Since the enemy knew that the arrival of the "old man" in any new locality spelled action within a few days, Japanese plans were changed.

An interesting sidelight on communications security deals with a U. S. fighter squadron commander in Northern Australia. The commander had radar and several spare radio receivers. His operators on the spare receivers heard Jap bomber and fighter planes warm up, tune their radio sets, and make departure reports. With the help of the radar to give him distance and direction he downed 86 bombers in one week. His loss? One fighter whose pilot was saved. And yet none of his operators knew any Japanese or any calls or ciphers.

Security, of course, is a two-edged sword. One edge is the sharpened edge called *security;* the other is a blunted edge: *insecurity.* A variation of either or both can be used to advantage by any alert commander.

Communications Deception

For example, all accounts of the capture of France, Denmark, Norway, Poland, Czechoslovakia reveal that the Germans inserted false orders into the military and civil communications system, thereby greatly confounding the defense. Thus the certainty or security of communications—and the ability to counteract successfully enemy action—was lost to the defenders. Insecurity of codes, ciphers, authenticators, and circuit control of the victim systems always can be profitably exploited by an invader.

These incidents, and others too numerous to tally here, were contributing and all-important factors to victory—or defeat. They should certainly establish the importance of communications security to any commander. Without security a skirmish, an engagement, a battle—even a war—can be lost.

What then is *security* of communications?

Communications security simply is the protection resulting from all measures designed to deny to unauthorized persons information of value which might be derived from communications.

We *may* not always have security. We *cannot* always have security. We even may not always *want* security. But we should always *know* what security we *do have.*

The degree and extent of security wanted is a matter for a commander to determine, to know and to control.

Communications security may be divided into four broad phases: (1) censorship—control of material permitted to be communicated; (2) physical safeguarding of classified information and documents; (3) cryptographic safety afforded by codes and ciphers; (4) transmission security of different means for communicating.

Radio Use and Misuse

Modern warfare on a global scale calls for the use of radio on an unprecedented scale. Because only radio can take dispatches to and from fields of action without dependence upon miles of wire and can span swiftly the distances and areas involved, it must be used. But it must be borne in mind, constantly, that the enemy also uses it and for that reason radio is subject equally to advantages and disadvantages.

Ignorantly used—and ignorance here means carelessness and insecurity—radio may visit damaging and destructive repercussion upon entirely innocent forces.

The disadvantages of radio are many and varied: it blankets thousands of square miles needlessly; it reaches

enemy headquarters and the ears of unwanted listeners; it discloses the existance, position and movement of the using force. However, all other things being equal, a security-conscious commander has a distinct advantage over the enemy commander—he has the initiative.

Enemy Invited by Radio

An example of a radio message reaching unwanted ears deals with the famed Gen. Terry Allen of the equally famed 104th Division in Germany. Gen. Allen called his subordinates together for a meeting at 10 o'clock of a certain day in a certain chateau. About 1 minute past 10, the chateau was shelled. One officer was late. When questioned, he recalled that the conference had been called by radio-telephone.

Radio offers both sides opportunity to place trained, clever operators upon circuits to: (1) request repeats and acknowledgments; (2) give receipts falsely for intended recipients who did not get delivery; (3) impersonate our operators and introduce false, confusing or time-consuming operators' signals; (4) retransmit our own messages to us in slightly altered form to clog the circuits, require service messages and waste the time of our coding boards by feeding them garbled or undecipherable messages which in turn require service messages.

Jamming

Jamming likewise is an effective harrier. During World War II there were few long and continuous periods of jamming. Sometimes the enemy jammed co-incidentally with the launching of an operation to embarrass it and lessen the chances of successful shifting to other frequencies and re-establishing nets or circuits. Incidentally, jamming is a good technique since frequently several days are required to get re-established on a new frequency plan.

Jamming itself, however, brings up an interesting question. Shall communications be jammed and intelligence gained from listening to traffic be sacrificed? Obviously, the commander himself will have to decide on the relative value of jamming based upon his estimate of the situation.

The old accepted axiom that "a chain is only as strong as its weakest link" applies equally well to radio. Especially is this true in joint or combined operations.

For example, if three services are operating together and two maintain excellent security discipline, an enemy will have to intercept only the traffic of the one weak service.

Likewise, an alert enemy will watch carefully the messages from our civil agencies. Frequently, intelligence interpretation of a seemingly innocuous message may reveal much in the way of military maneuvers. All of which, of course, once more stresses the need for over-all security in the most superlative sense of the word.

Need for Knowledge by All

Briefly stated, every radio message, origin notwithstanding, must be secure if it relates even indirectly or remotely to operations. Although each military service has security organizations of its own, there is still much coordinating and educational work to be done on a joint or combined level.

Admittedly radio is difficult to control. Its comparative newness and the special skills required to harness its capabilities leave the door open to frequent breaches of security. The complicated operational procedure developed to permit speed of transmission and at the same time afford a certain amount of security places a considerable burden on the operating personnel.

Rare is the officer who can encode, send, receive and decode a message. Rarer yet is the officer who can, who does listen in on his own circuits. Yet, this same officer undoubtedly possesses knowledge of, and control over the normal living and fighting activities of his men. Every officer of whatever rank should have rudimentary knowledge of communications procedure.

It is important to note here the swing to radio telephone increasingly hailed by all services as the best use of radio for communications. Granted—it is an excellent and invaluable medium for tactical situations. What must be stressed, however, is that anyone who uses a radiotelephone must be trained and capable of exercising sound judgment. It is no secret that airmen love to talk, and such talk can and does lead to insecurity of communications.

How many men who indulge in glib chit-chat *are* security conscious? During World War II, there were few. Officers as well as enlisted men offended.

The security organization in a command has a responsibility second only to that of the commander himself. Without security of communications, there is insecurity of any planned program. Lastly, insecurity of a planned program inevitably leads to containment or defeat.

Security Functions

Generally speaking, what are the duties of a security organization?

First, it must examine its own communications to keep the commander informed of exposures of his military strength or intention, disclosed through his use of communications.

Second, it must correct and prevent poor communications practices. This includes the spotting and reporting the violations and idiosyncrasies of individual operating personnel. To be fully effective, all operators must conform to a standard operating procedure.

Additional duties performed by the security group or unit includes monitoring the important radio circuits to discover what inadvertent mistakes or practices yield information valuable to the enemy. It is unfortunate but true that the perennial shortages of skilled radio operators requires that a security unit constantly check its own operators. Sincere but untrained operators can relay almost a complete story of the shifting scene to the skilled enemy observer.

A study and analysis of traffic on all circuits which the enemy can hear should be plotted. Such a study can reveal important information even though the calls of the dispatchers are not understood and the texts are completely unknown. It is at once evident that our deception plans may be vitiated unless an analysis of our radio circuits substantiate the fake operation.

CO Must Know Security Status

By decoding all our own traffic, we can determine what misuse or abuse has weakened our cryptographic security. All mistakes should be brought to the attention of the commander for his evaluation and consideration as he makes future decisions. The importance of reporting cryptographic insecurity to the commander cannot be emphasized too highly at any time.

Nor should regular reports to the commander on the status of his communications be overlooked. In fact, a commander should know the status of his communications security just as he does his fuel and ammunition supplies, his men and the terrain. Thus, he is better equipped to evaluate his state of strength and weakness in communications in relation to his over-all planning program.

The status of communications security is especially important in joint or combined operations. Admittedly, the work is made doubly difficult in that it entails criticism of allies. That it constitutes a particularly challenging task requiring both patience and tact is not to be denied. Yet success of operations makes a prompt, non-partisan report mandatory.

Summary

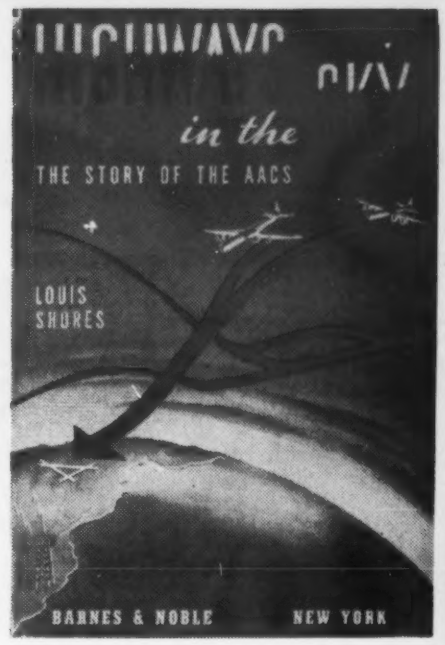
In conclusion, it should be stressed once again that communications are part of the commander's being, a projection of his will, and an instrument for victory. Communications are not to be regarded as a service of supply. Nor are they to be regarded as are food, gasoline or ammunition.

Communications are the nerve center of the military body. As such they must function smoothly and at a maximum of efficiency. I repeat once again the complements of security: we may not *have* security. Perhaps we *cannot* have it. In some circumstances we may not *want* it. But always we must *know* whether or not we have it.

Therein may lie the margin for victory.

The appointment of Maj. Gen. H. M. McClelland to the newly created post of Director, Communications-Electronics for the Department of Defense and the Joint Chiefs of Staff, brought to mind the section of Highways In The Sky which is reprinted on this page. This extract is reprinted with the permission of the author, Louis Shores, and the publishers, Barnes & Noble.

Dr. Shores, who was in the AACS himself during WW II, as a major in the CBI Theater, has agreed to write an original article on the career of Gen. McClelland and air communications for publication in a future issue of SIGNALS.



All royalties from Highways In The Sky, and other published writings of Dr. Shores on the AACS, have been assigned to the Air Force Air Society.

Fortunately there were a few pilots in the Air Corps who believed in radio just as strongly as Wally Smith.* For example, there was Harold McClelland.

On July 19, 1934, Lieutenant Colonel Henry H. Arnold, chief disciple of Billy Mitchell and defender of air power, had led a mass flight of ten Army bombers over 8,000 miles from Washington, D. C., to Alaska, without a mishap. For that he had been awarded the Mackay trophy. For that he had been applauded as establishing the safety of the airplane for long-distance travel and transport. The fact was, however, that he had actually proved that highways in the sky are necessary before airplane travel can be safe and regular.

Before he took off for Alaska, he built himself the semblance of a highway in the sky. There would be no "iron compass" flying on this trip, no pilot peering below for railroad tracks and flaming pines. This was no cross-country run, no stunt, no heroic example of "pasture" flying. This was a serious attempt to prove that air travel was here to stay—that it could be made regular and safe; that fast transportation demanded fast communication — the fundamental of a highway in the sky.

So Arnold put Harold M. McClelland in charge of communications. McClelland was one of the few pilots, in those early days, who understood the importance of radio in relation to flying. Most of the other so-called "hot" pilots would not even tolerate a radio set in the plane. Lindbergh had made his transatlantic hop without one. Many distance records had been established without radio communications. Pilots generally preferred to travel without the contraptions in the cockpit.

Now, this was no unreasonable prejudice. Before Arnold's flight, and not so much before, at that, reception in an airplane was annoying, if not absolutely impossible at times. The whir of the engine and the interference of ignition created a rasping static. What was more serious, crude and complicated wiring introduced a hazard that had more than once forced a pilot to bail out because of fire. No wonder, then, that pilots, in spite of regulation, conveniently "lost" their headsets overboard.

The Arnold flight was different. It had the advantage of a fully bonded and shielded engine in the B-10. Its planes were equipped with radio sets that provided excellent reception. Nevertheless, to overcome any lingering prejudice, McClelland was placed in charge of all communications on the flight. Arnold knew that McClelland would enforce radio discipline. Only one month before, the Army had completed a period of carrying the mail. Arnold knew that no small portion of the later success was the result of McClelland's communications effort. McClelland, and his assistant Ivan L. Farman, recognizing from the start the importance of highways in the sky, had worked day and night to install and maintain good radio equipment on their planes. The results had shown in a remarkable record for regularity and safety on their portion of the route. As a result of their communications efforts, the Army had done something with the mail that had been little publicized. It had flown more mail with one less fatality than the commercial air lines ever had, for a similar period of time.

As Communications Officer for the Alaskan flight, McClelland also piloted one of the three liaison planes. Arnold himself flew the lead plane and McClelland assigned to it, as crew chief, a veteran air-communications man named Walter B. Berg. But most important of all, McClelland arranged with the War Department to have every Signal radio station along the route alerted to use such range facilities as were then available. There were the elements of the highway in the sky—*point-to-point, air/ground, navigational aid* and *airdrome control.* Available, too, for the first time were airmen aloft who were skilled in the use of the radio components of the airway.

The success of the Alaskan flight, during the summer of 1934, led to a Labor Day conference in Arnold's office with McClelland. Both agreed that airways communications had been one of the significant reasons for the success. Both set about planning a permanent airways-communications system that would make mass flights of planes safe and regular at all times. To McClelland went the assignment.

McClelland enlisted the help of Wally Smith in OCAC. Wally belonged to that cortege of airmen who believed in the airways that radio alone could create for the airplane. Together they studied the fine system of civil airways under the aegis of the Department of Commerce and the commercial air lines. By 1934, there were operating some thousands of miles of good airways connecting the principal cities of the United States. These airways included *point-to-point* communications by teletype, as well as by radio, between airports for flight messages. They provided also for *air/ground* and *ground/air* communication between these airports and planes in flight. Through the inventiveness of civilian radio engineers like Leuteritz of RCA, the radio range was being improved and new navigational aids, such as direction-finding, were being introduced. An excellent system of airdrome control, already developed, included collection and dissemination of meteorological information. In short, the aviation ball that had been carried by the military in the twenties was now largely being advanced by civilian agencies.

A comparable military airway was needed to connect Army bases, which, as often as not, were off the civilian routes and at some distance from cities. McClelland saw that, and so did Wally Smith and the other airways-minded airmen. But McClelland and Smith saw also that the meager resources of the undernourished Air Corps could never support anything so elaborate as the civilian airways.

In 1934, such Army air bases as Mitchell Field in New York, Bolling Field in Washington, D. C., Selfridge Field in Michigan, Kelly Field in Texas, March Field in California, and perhaps a score of other military establishments had some of the elements of airways stations. They operated *point-to-point* radio and, in a few instances, maintained control-towers and radio ranges. But what were lacking were coordination and full-time devotion to airways communications. Under the system then existing, radio and tower operators, for example, could be used to service planes, to do KP, to perform messenger duties—to undertake a thousand and one things not directly related to airways service. Each post commander made rules for his base, and those who worked at the airdrome were subject to the varying demands of the individual posts.

*Now Brig. Gen. Wallace G. Smith, commanding officer of the Airways & Air Communications Service.

Dr. Shores had been a college professor, director of the library school at George Peabody College, and the author of educational books when he enlisted in the Army Air Corps early in WW II. After a few weeks of basic and cryptographic training he went to the CBI theater where he was assigned to the AACS, first as cryptographic officer, and then as commander of the 10th AACS Squadron. He returned to AACS Hq in 1944 to prepare the command's history.

RELATIONSHIP OF THE ARMED SERVICES ELECTRO-STANDARDS AGENCY WITH INDUSTRY

By Lt. (jg) Arthur Powell
USNR (ASESA)

Captain H. E. Bernstein, USN, director of the Armed Services Electro-Standards Agency, has suggested that any of our group members interested in ASESA specifications should write to him for an index of the specifications and other data as he would like recommendations from AFCA groups whether or not they are RMA members.

In the event of mobilization, the armed services will be faced with two major problems in the field of electronic components—insuring that quality components will be used in military equipment and that the supply of parts for manufacturing and replacement in the field will be adequate. The Armed Services Electro-Standards Agency, located at Fort Monmouth, in conjunction with industry, is presently engaged in a program of electronic component standardization which will enable the military establishment and the parts manufacturers to meet these problems in a national emergency. Standardization is being accomplished by preparing and issuing standard specifications for form factors and performance, establishing approved sources of supply, and guiding the three services and industry in the practical application of the program.

Standards Phase

While the parts in electronic equipment used by the military services must be of a quality which will withstand severe field conditions, they must also be capable of being mass produced by current industrial methods. Thus, in formulating a specification for the military establishment, industry must be given the opportunity to comment during the various stages of development.

In the first draft of a specification for the military establishment, the general requirements of the individual services, and wherever practical, the requirements of the corresponding RMA specification are included. This draft is circulated, in addition to the interested government parties, to commercial manufacturers of the item who return their comments to the Radio Manufacturers' Association data bureau. Comments from industry are screened by the data bureau, and a correlated reply representing the manufacturer's opinion of the specification is sent to ASESA. These suggestions, along with those from the armed forces, are reconciled and incorporated into a single specification in the military establishment form representing the best compromise between the exacting military requirements and the limitations of present-day quantity production line methods. This same procedure is in effect for revisions and amendments to existing specifications.

The final specification may require several draft circulations by the above procedure until an agreement has been reached. While this may seem unwieldy, the benefits to the Government in insuring that interchangeable quality items are available and in bringing to industry the advances made in the component art resulting from government sponsored research are well worthwhile.

In conjunction with this, proposed RMA specifications on components are forwarded to ASESA for comment and comparison in order that the JAN standards may be incorporated, if practicable.

Test and Approvals Phase

When a new specification has been issued, approved sources of supply for the component must be established. In accordance with the armed services procurement regulations, manufacturers are invited to submit samples of their product to ASESA as provided by the specification to prove their ability to meet the requirements. Tests are conducted at the Navy material laboratory and at the Signal Corps engineering laboratory. Results are reported to ASESA where they are evaluated and recommendations made to the three services for approval or disapproval as the case may be.

If approved, the manufacturer is granted an approval certificate outlining the extent to which his product meets the requirements of the applicable specification and his name is placed on the Army-Navy-Air Force qualified products list. This list is available to all procurement and contracting organizations of the three departments who in turn make the information available to authorized commercial prime contractors using JAN parts or materials in their end product.

In the event the producer fails the qualification test, the test report and tested samples, representative of the failures, are returned to him along with a recommendation by the agency for correcting the weaknesses. The manufacturer is encouraged to resubmit samples, but in order to conserve testing time and funds, a reasonable assurance that the cause of failure has been corrected must be made before the samples will be accepted for retest.

Applications Phase

To implement the standardization program and to advertise the general use of standard parts, both from the technical and the logistics standpoint, publications are issued for the guidance of the designers of electronic equipment and the officers responsible for the supply of replacement parts. The armed services preferred parts list contains selected items from the catalogue section of the specifications under ASESA's cognizance and items on which no specifications exist, but which will be covered by a standard in the future. Values have been selected which it is felt will cover practically all of the needs of normal design. The list has been circulated to laboratories and development contractors with the intent of controlling the numbers of types and styles of components being incorporated in electrical and electronic equipment. The effect of this will ultimately be realized in a substantial reduction in the variety of items required in the field supply systems.

In many cases, no qualified sources of supply have been established for items which are essential in equipment production. In this case, it is planned to issue lists in supplement to the qualified products list mentioned above which will contain recommended near standards or temporary approved substitute. Items will be included in this list when, on the basis of factual engineering data, it is believed that they will meet the qualification test requirements of the specification or when the item fails to meet the tests by a small margin and insufficient qualified sources are available. These lists will also serve as a guide in design and procurement.

Overall standardization is a complex problem and cannot be acomplished on short notice; the program must be well established during peacetime before military expansion is begun. Realizing this, ASESA and the component parts industry are now continuously working together to accomplish the mission of standardization and to advance the level of performance as the art and know-how progresses.

We're Sorry-or-Please Pass the Carrots

The "radio propagation and use of antennas" article by Col. Gaither in our July-August '49 issue drew considerable comment, especially from industries and schools requesting permission to reprint the article for instruction purposes. Because of the widespread interest in the article we are giving prominence, on this page, to a correction by the author. Along with his letter we are republishing the section which was in error, and the pertinent charts.

Gentlemen:

Please pass the eraser! To my chagrin I find the number 10.6 in the second line from the bottom, lower left, page 7, July-August (49) issue of SIGNALS to be in error, and furthermore the error is all mine.

As anyone with reasonable good sight can see, the reading from Figure 3 should have been (approximately) 18.0.

If one uses the correct figure of 18.0 in lieu of 10.6, the *correct* final solution and range is:

18.0 x 6 x 2.5 = 270 miles.

Contritely yours,

LOREN E. GAITHER
Lt. Colonel, Sig Corps

P.S. Before submitting the article I did ask a friend to double-check my calculations, but it seems he also spent the war in the C.B.I. We remember those ubiquitous fillets of bullock-horn. We *never* did get carrots!

Because we did not catch the error either, we say, *"Please pass the carrots."*

Following is the section in error as it originally appeared.

For a second example, suppose we have a radiotelephone transmitter capable of radiating 1,000 watts on a fixed frequency of 2,000 KC and we wish to know the maximum communicating range from Island I, latitude 8° south, over sea-water to a receiving station on a ship. Good receiving conditions are known to exist on the ship. Figure 2 will indicate for night operation, a *required* signal strength of about 27.5 units (5.5 times the latitude factor of 5). Fig. 3 will indicate a working range of 63 miles (10.6 miles from the chart multiplied by the factor 6 noted at the bottom of the figure) under the stated conditions for a 50 watt transmitter. For our 1,000 watt solution we observe from 4, a means of obtaining our power factor; namely for a power ratio of 1,000 divided by 50, or 20, a factor 2.5,

Thus;

63 miles times 2.5 equals 157.5 miles—our final solution and our range.

While we're doing penance in the department of errors we will point at a blunder solely ours. In the Sept.-Oct. '49 issue we published an article by Col. Harold W. Grant on the communications-electronics school at Gunter Air Force Base. We labeled antennas in pictures with the story as being at the "Gordon School." Tss tss!

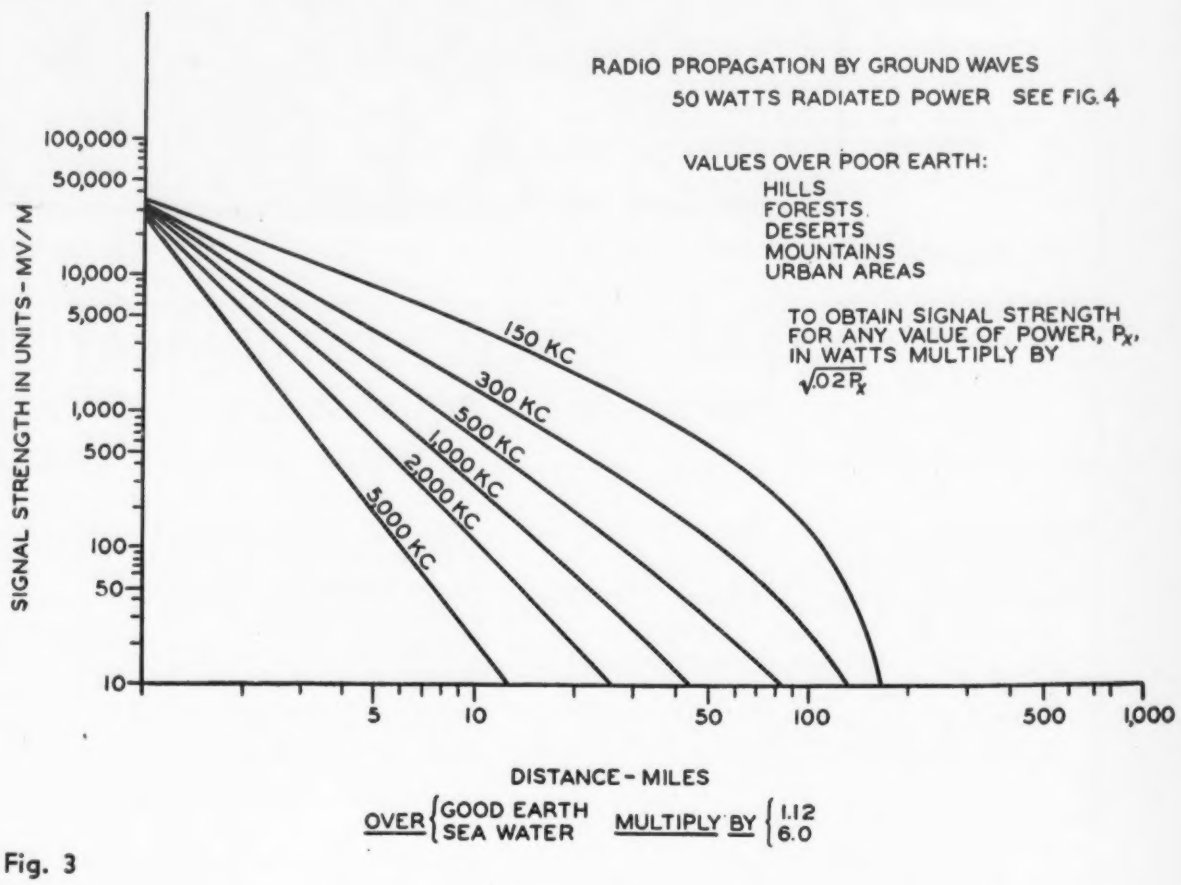
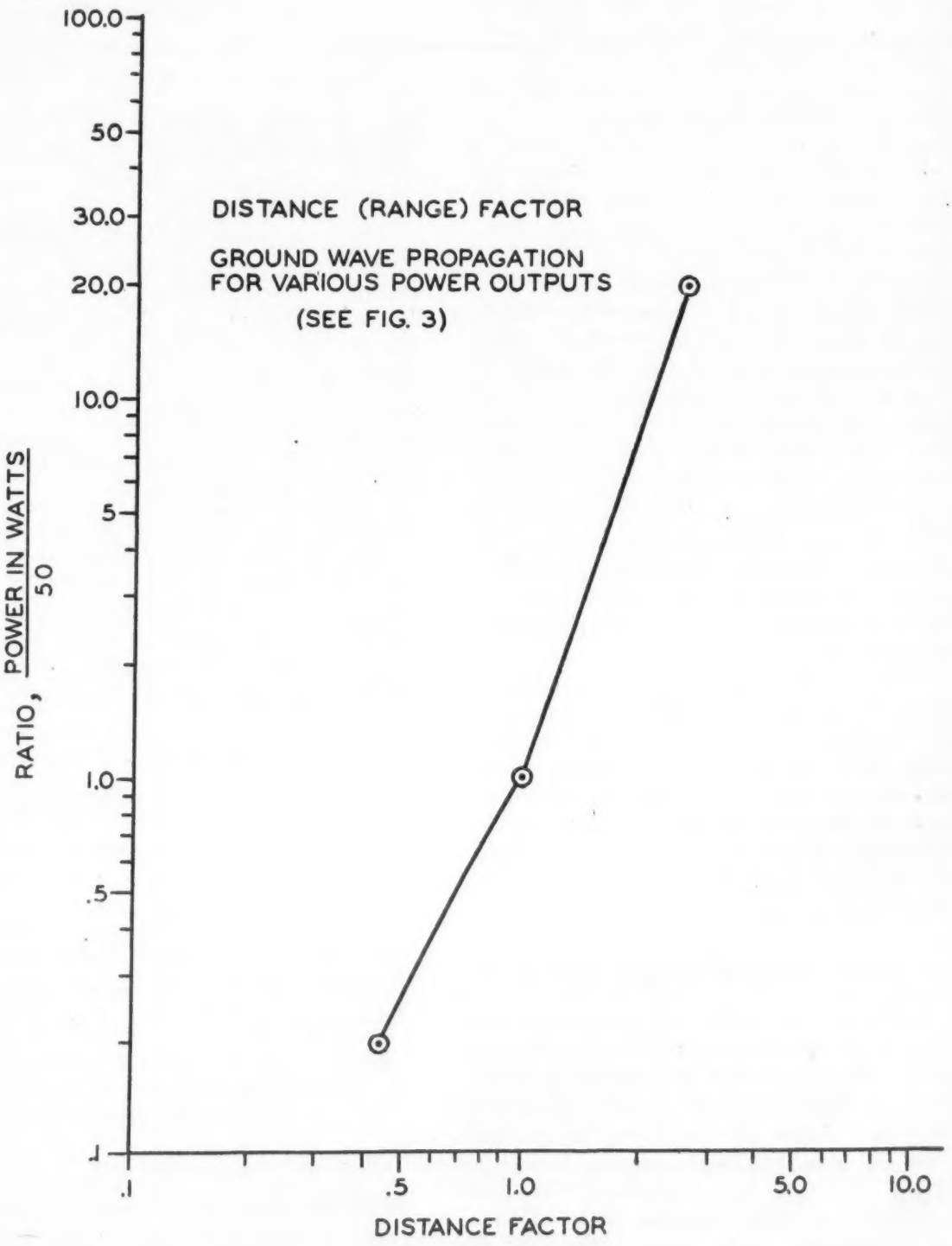


Fig. 3

Fig. 4



ASSOCIATION AFFAIRS

ARMED FORCES COMMUNICATIONS ASSOCIATION

1624 Eye Street, NW, Washington 6, D. C. Phone: EXecutive 6991

DIRECTORS AT LARGE

Theodore S. Gary (1950)
Carroll O. Bickelhaupt (1950)
Dr. Lee De Forest (1950)
Thomas H. A. Lewis (1950)
Thomas A. Riviere (1950)
Fred R. Lack (1951)
Darryl F. Zanuck (1951)
A. W. Marriner (1951)
David Sarnoff (1952), *Past Pres.*
C. E. Saltzman (1951)
Leslie F. Muter (1951)
Dr. Frank B. Jewett (1951)
William S. Halligan (1951)
William C. Henry* (1951)
E. K. Jett (1952)
Jennings B. Dow (1952)
S. H. Sherrill* (1952)
Thomas J. Hargrave (1953)
R. Adm. Earl E. Stone (1953)
J. R. Cunningham (1953)
Walter Evans (1953)
W. G. Eaton (1953)
Paul Goldsborough (1953)

OFFICERS

President:* Fred R. Lack
1st Vice-Pres.:* Theodore S. Gary
2nd Vice-Pres.:* Thomas J. Hargrave
***3rd Vice-Pres.:* R. Adm. Earl E. Stone**
***4th Vice-Pres.:* J. R. Cunningham**
***5th Vice-Pres.:* Carroll O. Bickelhaupt**
***Exec. Sec and Treasurer:* Brig. Gen. S. H. Sherrill,* U.S.A. (Ret.)**
Counsel:* Frank W. Wozencraft

*Executive Committee Member

1950 Convention

Previously, the dates and places of the annual meeting for 1950 had been announced as New York and Fort Monmouth, April 26, 27 and 28. For a number of reasons, one being conflicts with Army maneuvers which might prevent certain tactical units from participating at Fort Monmouth, it was decided by the executive committee to change the dates to: Friday, May 12—New York City; business meetings, panel discussions, conferences, luncheon and banquet, plus a visit to the Photographic Center at Astoria. Saturday, May 13—Fort Monmouth; exhibits and demonstrations of communications and photographic equipment and operations.

The Army Signal Corps, which is sponsoring the Fort Monmouth show, promises some events never before scheduled for any of our shows. More details will appear in January SIGNALS and application blanks will be sent to all members in February. But mark those dates now for a spring visit to New York!

Defense Staff Meets AFCA

Since we were formed and exist primarily to assist in strengthening America's military position in communications and photography, it seems desirable to learn from the highest levels the kind of help we might give.

On October 5th, together with the executive secretaries and other officers of twenty-two other associations which have assisted or can assist the Secretary of Defense in one way or another, AFCA's executive director spent the day at the Pentagon.

After a welcome and briefing by members of the Secretary of Defense's public information staff, Secretary Johnson himself, in a talk which was for the most part "off the record," outlined the objectives of his administration and paid tribute to the several associations and to their publications for the help they have given and indicated he felt that much can be done by them in current planning.

The Defense Department Chief paid special tribute to the Ordnance Association and its vice-president, Leo A. Codd, for its work during the past thirty years. Of special interest to AFCA was his reference to the consolidation of communications systems of the three services as a typical example of how the taxpayer's money can and must be saved by elimination of costly duplication of spending.

Col. O. O. Niergarth of the Munitions Board staff outlined the functions of the Munitions Board and the National Security Resources Board, in each of which committees have been or are being established to study all phases of industrial production and procedures for industrial mobilization planning. His report on accomplishments and current planning was of real interest to the audience. He emphasized electronics frequently. He indicated that manufacturers are encouraged to express their desires and suggestions and that special efforts are made to enlist the help and interest of subcontractors.

WHEN DOES YOUR MEMBERSHIP EXPIRE?

Look at the expiration date on your membership card. If it is within 30 days, it's time to pay your dues. Fill in this form and return with the correct remittance. If you do not use the form please pass it on to a friend for his use in applying for membership.

Armed Forces Communications Association
1624 Eye Street, N. W., Washington, D. C.

Enclosed is $..... for membership (new) (renewal) for one year in the AFCA.
Full—$5
Retired, enlisted, and up to Army, Air Force, or Marine lieut. or Navy lieut. (jg)—$3
Student—$2

Name.....

Address.....

City..... State.....

Addresses Unknown

Mail addressed to the following members has been returned to us. If you know the present address of any of them please jot it down on a post card and send it to us.

Larry P. Allred
Capt. Frank B. Austin
Pvt. Samuel R. Ballard
Cpl. Edwin M. Billings
Pvt. Lyndon B. Bledsoe
Glenn G. Button
Lorenzo Del Riccio
Sgt. 1/cl Ben H. Evans
Capt. John J. Evans
Capt. Douglas S. Fralick
Capt. Arthur M. Fredenburg
L. Delery Freret
Ralph Fullwood
T/5 John C. Gall
Lt. Gaudencio V. Guyot
Clair G. Heuline
Lt. Robert L. Howell
SFC Masayuki Kiyota
Lt. Harvey S. Leeds
Maj. Charles F. Ludden
Lt. Col. Victor T. Lyncy, Jr.
Jack V. Meeks
John S. Mehring
Edward Miccio, Jr.
Maj. Earle F. Mitchell
James K. Morrow
Maj. Irving L. Moskowitz
T/3 William E. Murphy
Gerald A. Murray
James T. Nash
Foster F. Oliver
1st Lt. John Michael Panek
Sam H. Perkins
Maj. Harry B. Rahner
Lt. Douglas M. Ross
LeRoy W. Sellek
Capt. Michael E. Seyster
Maj. Bernard Starzyk
Cpl. Isaac Stephens
Ray Stevens
Hal B. Tucker
Elo N. Vani
Marvin A. Woodward

National Advisory Committee Chairmen

BATTERY MANUFACTURING: **Dr. George W. Vinal, Bureau of Standards, Washington, D. C.**

DRY BATTERY SUBCOM.: **Mr. Ralph E. Ramsay, V. Pres. & Research Director, Ray-O-Vac Company, Madison, Wisconsin**

STORAGE BATTERY SUBCOM.: **Mr. L. E. Wells, Chief Engineer, Willard Battery Company, Cleveland 1, Ohio**

PHOTOGRAPHIC EQPT. SUBCOM.: **Mr. H. A. Schumacher, V. Pres., Graflex, Inc., Rochester, N. Y.**

PHOTOGRAPHIC SENSITIZED MATERIALS & CHEMICALS: **Joseph C. Wilson, Pres., The Haloid Co., Rochester, N. Y.**

PUBLICITY: **Mr. Orrin Dunlap, Jr., RCA, 30 Rockefeller Plaza, New York 20, N. Y.**

MILITARY TRAINING: **Major Gen. G. L. Van Deusen, Pres., RCA Institutes, Inc., 340 West 4th St., New York 13, N. Y.**

Curtis Mitchell, Osgood Roberts, Robert Ruskin—all of the information staff—outlined their missions and offered assistance to the associations and their chapters and members to increase their ability to help the preparedness effort. They want our help in publicity in our journals, will give us early releases, including additional ones of special interest for chapter area publicity. It was emphasized that it is not expected that they will control our editorial policy in any way.

The final address was by one of the Army's most brilliant young generals—Lieut. Gen. Alfred M. Gruenther, for over two years senior member of the military staff for Secretaries Forrestal and Johnson, and who recently was replaced by Rear Admiral Davis so that he could become deputy chief of Army staff. His presentation, which was in the best War College manner, was highly classified and entirely off the record. He explained the current international strategical situation, showing what, when, and how our country may be threatened, the limitations of the threat and other information on which present joint chiefs of staff planning is based.

At the luncheon, Assistant Secretary of Defense Mark Leva, who had also served in that capacity for Mr. Forrestal after his wartime Navy service, in a talk which impressed the guests with its clarity and thorough coverage, listed the accomplishments of the unification program.

The audience was impressed with the tremendous importance of the unification program as presented by all speakers, especially its theme of savings in the taxpayers' dollars in countless ways and the need for ever closer relationship, understanding and cooperation between all the services and all sections of them and industry and civilians in all walks of life.

The defense status as presented by the day's speakers made clear that AFCA's *main mission* should be to bring the communicators and the allied photographers together frequently so that they may know one another, their equipment, and their procedures, to the end that the United States in military and civilian defense may be better prepared, that all may profit by the closer relationship—taxpayers, business, industry and the regular and civilian components of all the services.

A secondary mission is the availability of our association, through a membership eventually to include *all* the best Americans in these fields, for advice when the defense department desires it, on industrial and personnel problems and, equally as important, for suggestions initiated by our members for consideration by the services and civil defense planners, thus helping the Armed Forces to keep abreast of the rapid and far-reaching advances in technical and scientific knowledge as applied to communications and photography in all the arms and services.

Position Wanted

B.S., E.E., now earning $5000 per annum in electronics education, seeks opportunity in maintenance research. Contact Howard C. Christian, Capt., SigC-Res, 2824 W. Biddison, Ft. Worth 4, Texas.

Executive Committee Meeting

The fall meeting of the executive committee in Washington on September 14th was attended by President F. R. Lack, Vice Presidents T. S. Gary and Rear Admiral Earl E. Stone, Counsel F. W. Wozencraft and Executive Director S. H. Sherrill. Principal item discussed was the annual convention. The budget, substantially the same as for FY 1949, was approved. The winter meeting of the committee was held in New York on December 7th. Details of action taken will appear in January SIGNALS.

Reprints from Signals

As a result of a conference with General Sherrill when he visited West Point in August, Col. B. W. Bartlett, Professor of Electricity at the USMA, decided to supply each cadet of the second class in electricity with tear sheets of a feature article in July SIGNALS. This and other articles are being used and reprinted more and more by schools and other journals, especially in foreign countries. We are proud of the recognition our authors have received through the circulation of SIGNALS.

CCAFA

At the regular monthly meeting of the Coordinating Committee of Armed Forces Association, Col. Leo. A. Codd, veteran executive vice president of the American Ordnance Association and editor of "Ordnance", was elected to succeed Col. Ludlow King as chairman of the committee.

Col. Codd has many years' service in the Ordnance Association in his present capacity. He served in the procurement division of the office of the chief of Ordnance in World War I and as a colonel, Ordnance Dept., executive assistant to Lt. Gen. Levin Campbell, Chief of Ordnance in World War II, for which service he was awarded the Legion of Merit. Under

(*Continued on page* 27)

ARMED FORCES COMMUNICATIONS ASSOCIATION

1624 Eye Street, N.W.
Washington, D. C.

CONSTITUTION and BY-LAWS

Adopted April 29, 1947
Revised May 11, 1948 and March 28, 1949

For the information of our members there is published here our Association's Constitution and By-Laws to include revisions made at the annual meeting in Washington, D. C.

Printed copies will be mailed to any member upon request.

PREAMBLE

The Armed Forces Communications Association, organized in 1946 and incorporated on June 30, 1947 under the laws of the District of Columbia as the "Army Signal Association" and on December 30, 1947 as "Armed Forces Communications Association," is a national membership society of more than ten thousand American citizens pledged to preparedness against war in the communications and photographic fields.

The Association endeavors to keep alive an interest in and knowledge of the design, production, maintenance and operation of military communications and photographic equipment.

The Armed Forces Communications Association believes that the solution of this problem, based on experience, lies in an active organization at all times cooperating with the Government. The principal objective of the Association is an active membership of American citizens, on whom the duty of design, production, operation and maintenance of this type of equipment will fall in war, who will have an accurate and authentic knowledge of its complex requirements.

The Association is entirely patriotic; it has no commercial interests, no political alliances, and no religious affiliations. It is not operated for profit; its income is expended in furthering its aims. Its elected officers and directors serve without remuneration. Membership, to which American citizens are eligible, is described in the By-Laws.

SIGNALS, the journal of the Association, is published solely for the purpose of disseminating information of interest and importance to our members.

The constitution and by-laws published here are the revision approved by the membership April 29, 1947, revised May 11, 1948 and March 28, 1949. They were prepared after much study by a special committee consisting of: C. O. Bickelhaupt, William J. Halligan, H. C. Ingles and F. W. Wozencraft. They replace an interim constitution and by-laws which governed the Association during the first year of existence, until 29 April 1947, and were drawn up in April 1946 by Major General H. C. Ingles, Brigadier General S. H. Sherrill and a committee under the chairmanship of Lt. Colonel James W. Baldwin, Office Chief Signal Officer, with the advice of Mr. C. S. Hawley, attorney for the American Telephone & Telegraph Company.

CONSTITUTION

ARTICLE I
NAME AND LOCATION

Sec. 1. The name of the Association shall be Armed Forces Communications Association.

Sec. 2. The executive offices of the Association shall be in the city of Washington, District of Columbia.

ARTICLE II
OBJECTIVES

Sec. 1. The Association shall be a patriotic, educational, scientific and non-profit-making organization of American citizens, dedicated to scientific, industrial and military preparedness for the common defense, thus contributing to national security and peace.

ARTICLE III
MEMBERSHIP

Sec. 1. Membership in the Association shall be open to all men and women who are American citizens and who are interested in furthering the objectives of the Association as set forth in this Constitution and in the By-Laws. The classes of membership and the fees therefor shall be as prescribed in the By-Laws.

ARTICLE IV
GOVERNMENT AND OFFICERS

Sec. 1. The government of the Association shall be vested in its Officers, the Council, a Board of Directors and an Executive Committee thereof.

Sec. 2. The Board of Directors shall consist of the three immediate past presidents, the President (who shall be "ex officio" chairman), the Vice Presidents, and 16 other members elected by the Council, all to serve four years from the 1st of July following their election and the representatives of the chapters, chosen as Council members in the manner prescribed under Sec. 2 of this Article. The Board of Directors shall have the power to fill casual vacancies in the case of its members and in the offices of President, Vice Presidents and other national officers and to initiate executive measures necessary to achieve the objectives of the Association. The Board shall meet at least once each year, usually at the same time and place as the annual Council meeting.

Sec. 3. The Officers shall consist of a President, a First Vice President, a Second Vice President and such additional number of vice presidents, not to exceed three, as may be authorized by the Board of Directors, all of whom shall be elected by the Board of Directors from its own membership for a term of one year beginning on the first of July following their election, and a Counsel, a Treasurer, and an Executive Secretary who shall be elected by the Directors and who shall hold office a minimum of four calendar years and until their successors have been elected and qualified. Regular Service personnel while on active duty status shall not be eligible to hold a paid national office in the Association.

Sec. 4. The Council shall elect the Board of Directors. It shall consist of (1) one representative for each 100 members or fraction thereof of each chapter, elected by the chapter members for a period of one year beginning on January 1st each year, (2) the three immediate past presidents, (3) the current national officers and national directors. The National President of the Association or senior Vice President in his absence shall serve as Council chairman. The Council shall have power to fill unexpired terms of its members. It shall meet once each year at the call of its chairman but, if necessary, its business may be transacted by letter. A majority vote of its members voting, in person or by letter, shall be necessary for election to membership on the Board of Directors.

Sec. 5. The Executive Committee shall consist of the President and two senior Vice Presidents and one Director to be appointed annually by the Board of Directors and shall have power to take ad interim action, subject to approval by the Board at its next subsequent meeting, upon all questions which require action by the Board. It shall have such other duties as prescribed by the Constitution and the By-Laws of the Association. The Executive Secretary, the Treasurer and Counsel shall be "ex officio" members of the Executive Committee.

Sec. 6. The Board of Directors shall have power to make By-Laws for the government of the Association and to alter, change or amend the same. All decisions in boards or committees shall be decided by majority vote of those present or those voting if by letter vote, unless otherwise stated.

ARTICLE V
MEETINGS

Sec. 1. The Association shall hold an annual meeting in the spring of the year at a time and place to be designated by the Executive Committee. The purpose of the meeting shall be in conformance with the objectives of the Association and for each meeting the Executive Committee will prepare a program to include where possible the demonstration of such military communications and photographic equipment and training as may be authorized by proper authority. There may also be meetings devoted to discussions of scientific, industrial and military experience, related to preparedness and national security.

Sec. 2. The Association may hold such special meetings as may be necessary, to be called in the manner provided by the By-Laws.

ARTICLE VI
CORPORATE OBLIGATIONS

Sec. 1. No obligation shall be incurred on behalf of the Association except by the Executive Secretary and by him only to the extent of funds in the Treasury available to meet the obligation. All obligations incurred by the Corporation shall be solely corporate obligations and no personal liability whatsoever shall attach to, or be incurred by, any member, officer or director of the Corporation by reason of any such corporate obligations.

ARTICLE VII
AMENDMENTS

Sec. 1. Amendments to this Constitution may be proposed by a majority vote of the Board of Directors or of the Executive Committee or upon petition addressed to the President and signed by not less than five (5) percent of the total number of full members.

Sec.2. Proposed amendments shall be submitted to the entire active full membership by letter ballot and shall be adopted if a majority of the votes cast are in favor thereof.

Sec. 3. Voting shall cease and the polls close on amendment to the Constitution on a predetermined date not less than thirty (30) days after the ballots have been mailed to the members. The votes shall be counted by a committee of three tellers appointed by the President and certified to the Executive Secretary within fifteen (15) days after the polls have closed.

Sec. 4. Amendments, unless otherwise provided for, shall become effective upon receipt by the Executive Secretary of a certificate of their adoption by the tellers.

BY-LAWS
AIMS AND PURPOSES

1. The aims and purposes of the Association shall be:

a. To educate all concerned, including the public at large, in the requirements and importance of military communications, electronics and photography.

b. Promotion of efficiency in military communications, electronics and photography, especially through better liaison between industry and the Armed Forces, as well as among the three Services themselves. This will include the maintenance of closer relations than ever before between civilian scientists, engineers, manufacturers and operating companies and those concerned with similar activities in military, naval and air force communications, radar and photography.

c. To assist in developing and maintaining efficient personnel—commissioned, enlisted and civilian—for the supply (including design and development), installation, maintenance, and operation of communications, electronics, motion picture, and photographic equipment in the Armed Forces—Active and Reserve.

d. To commemorate the services rendered by the communications, electronics and photographic industries, all others interested in these activities, and by the personnel of military communications and photography and American scientists in the wars in which the United States has been or may be engaged.

e. To preserve and foster the spirit of fellowship among former, present and future communications, electronics and photographic personnel of the Armed Forces—commissioned, enlisted and civilian—Regular, Reserve or National Guard.

f. To encourage adequate military training throughout the Nation, the upbuilding of adequate enlisted and commissioned reserves, and effective industrial preparedness for war, in the fields of communications, electronics, and photography. This will include stimulating interest in the design, modification, and production of photographic and communications equipment for military use.

CLASSES OF MEMBERSHIP

2. FULL MEMBERSHIP in the Association shall be open to all American citizens interested in advancing the aims of the Association and in any phase of national defense—especially in communications and photographic phases thereof. Present and former officers, enlisted men and women and civilian employees in photography and communications, whether in the Air Force, or Army or Navy, shall be especially encouraged to become full members.

3. LIFE MEMBERSHIP in the Association shall be open to all men and women who are American citizens and who are interested in promoting the objectives of the Association. Life membership shall continue during the lifetime of the life member and shall expire at death. It shall not be transferable.

4. STUDENT MEMBERSHIP in the Association shall be open to all men and women who are American citizens and who are students in the service academies, schools and colleges and for one year after graduation.

5. ASSOCIATE MEMBERSHIP in the Association shall be open to enlisted men and women and officers of the grade of 1st lieut. and below in the Army, Air Force, and Marines, and of lieut. (jg) in the Navy and the Coast Guard.

6. GROUP MEMBERSHIP in the Association shall be open to all firms, companies and groups controlled by American citizens who are interested in promoting the cause of industrial preparedness particularly in connection with research, development, production, manufacture, operation and supply of communication and photographic equipment for the Armed Forces of the United States. Group members shall have the privilege of nominating ten of their employees or officials who are American citizens for full membership in the Association and members thus nominated shall pay no dues. Only five may be named for small business.

7. HONORARY MEMBERSHIP in the Association shall be proposed by at least ten full or life members of the Association and a favorable vote by three-fourths of the members of the Council voting shall be necessary for an election. Honorary life membership shall be offered to all former Chief Signal Officers of the Army and Chiefs of Naval and Air Communications who have served for a total of three years or more in peace and one year or more in war who have previously indicated their interest in the Association and its purposes by becoming members. Honorary life membership shall be extended to the Defense Department Director of Communications and the Chiefs of Communications—Army, Navy and Air Force—as soon as they assume office, and honorary membership (ex officio) shall be extended to the Chairman of the Joint Chiefs of Staff and to the Chiefs of Staff of the three Services during their tenure of office. Honorary members shall be entitled to all privileges of full membership except as otherwise provided in this Constitution and in the By-Laws. Citizens of foreign countries are eligible for this class of membership.

8. The term "members" except where specifically stated otherwise in this Constitution and in the By-Laws shall mean full and life members only. Only these may vote or hold office.

9. The election to membership of all classes shall be entrusted to the Executive Committee, and the decision of that Committee as to eligibility shall be final.

10. Any person desiring to become a member shall make written application to the Executive Secretary. Said application shall be in such form and contain such data as may be prescribed by the Executive Committee. Said application may be acted upon by the Executive Secretary or the Membership Committee, in either case subject to subsequent approval by the Executive Committee.

11. Any member may withdraw from the Association at any time by tendering his resignation in writing, but such resignation shall not become effective until said member shall have paid all obligations due the association from him at the time of such resignation.

12. Any member may be dropped for cause by the vote of three members of the Executive Committee, or having been dropped may be reinstated at the discretion of the Executive Committee.

13. All members are entitled to receive one copy of the Association publication for which $3.00 of the annual dues are charged—except that the entire $2.00 of student dues is for the publication.

MEMBERSHIP DUES

14. The fee for life membership in the Association shall be one hundred dollars ($100.00) except for students in technical schools and the U. S. Military, Naval and Coast Guard academies for which the fee will be fifty dollars ($50.00). The annual dues for membership in the Association shall be: for full members, five dollars ($5.00), except for retired personnel who shall pay three dollars ($3.00); for associate members (enlisted and officers of the grade of 1st Lt. and Lt. j.g., and below), three dollars ($3.00); for student members, two dollars ($2.00); and for group members, two hundred dollars ($200.00), except for "small business" firms for which the annual dues are one hundred dollars ($100.00). "Small business" firms are those with 500 or fewer employees and individually owned and operated. An additional amount of five dollars ($5.00) shall be paid for each individual member nominated by the group member in excess of ten for regular group members and five for "small business" members. These sums are in addition to whatever dues or assessments may be imposed by the respective local chapters in the case of chapter members. Local chapters may collect whatever local dues may be assessed against their members. They may raise additional funds for local activities by subscription, voluntary contribution or other appropriate means.

OFFICERS

15. The President shall have general supervision of the affairs of the Association and shall perform the duties usual to his office. He shall preside at the meetings of the Council of the Board of Directors, and of the Executive Committee. He shall be "ex officio" a member of all committees and of all subcom-

mittees thereof. In the absence of the President his duties shall devolve upon the Vice Presidents in order of seniority of service in their office.

16. The First Vice President shall have general charge of memberships and the activities of local chapters and shall be charged with the responsibility of fostering their success.

17. The Second Vice President shall have general charge of the activities of the National Advisory Committees.

18. The Counsel shall be the legal adviser to the officers the Executive Committee and the Board of Directors.

19. The Treasurer shall be comptroller of the finances and accounts of the Association under the direction of the Executive Committee. He shall render an annual report and such special reports as may be called for by the Executive Committee. The accounts of the Association shall be audited annually by independent auditors. However, in the discretion of the Executive Committee a certified public accountant may conduct the annual audit, his report to be made to the Executive Committee.

20. The Executive Secretary shall make collection and disbursements, except as indicated in par. 23, under the supervision of the Executive Committee, shall keep the roster of the members and the records of the status of annual dues, shall be the keeper of the seal of the Association and shall have the custody of correspondence and records. He shall be responsible that suitable arrangements are made for the annual and other meetings of the Association, of the Council, of the Board of Directors, and of the Executive Committee, the proceedings of which he shall record. He shall submit an annual report to the Executive Committee for presentation to the Board of Directors at its annual meeting. He shall be responsible for the management of the executive offices and shall have the power to contract in the name of the Association for such services and supplies as are necessary for its operation. He shall have administrative charge of the activities and programs of the Association, of National Headquarters and all Association publications.

FISCAL

21. The fiscal year shall close on June 30 of each year.

CHAPTERS

22. Upon petition signed by not less than twenty-five (25) members of the Association in any locality, stating their desire to form a local unit for the more intimate achievement of the purposes of the Association, such unit to be known as a local chapter, the Executive Secretary of the Association shall immediately authorize a meeting for such inauguration and the Association shall contribute to the organizing expenses of such chapter the sum of one dollar ($1.00) for each such petitioner unless that amount already has been withheld by or paid to a chapter.

23. When not less than twenty-five (25) members of the Armed Forces Communications Association shall have enrolled as members of such chapter, the Association will issue a suitable charter thereto, signed by the President and Executive Secretary of the Association.

24. Every member of the Association may also be a member of the local chapter of the territory in which he resides, but no one shall be a member of a local chapter who is not a member of the Association. The local chapter, if and when it shall be organized to accomplish it, may collect annually all dues, both original and renewal, for all of its individual members. The sum of $1.00 may be withheld by the chapter for each full (or $5.00) member and the remaining $4.00 together with application form submitted by the member or a report showing data listed on his application will be sent to National Headquarters. Fifty dollars of the annual group membership fee of $200.00 ($10 of $100.00 small business fee), either original or renewal, shall be remitted to the chapter by National Headquarters if the remittance is made to that office; otherwise $50.00 shall be withheld by the chapter and the remaining $150.00 forwarded with the application form to National Headquarters.

25. The constitution of each local chapter shall be in the general form of that of the Association and shall be submitted to the Executive Secretary of the Association and approved by him before the same shall become effective.

26. It shall be the general purpose of the chapters to cultivate a more intimate understanding of military photographic and communications subjects through meetings, laboratory and plant visits, seminars and reports on special problems, consistent with the national objectives and policies of the Association. Chapters may organize such sub-chapters or posts in their zones as local interests may justify.

RESTRICTIONS

27. No officer or enlisted man on the active list of the Army, Air Force or Navy shall be employed by the Association in any paid capacity, but this shall not prohibit the acceptance of articles for pay from officers and enlisted men for publication nor their service as officers of local chapters.

NOMINATIONS AND ELECTIONS

28. The Council on or before February 1st of each year in which elections are to be held, shall deliver to the Executive Secretary in writing, the names of its nominees for the Board of Directors to fill vacancies which will exist on the date of the election. The Executive Secretary shall communicate with each nominee. In the case of the declination of any nominee to accept his nomination, the Executive Secretary will report the fact of each declination to the Council which will then nominate another member for the office. The Council shall meet at the call of its Chairman not later than June 30th to complete the election of directors to replace those whose terms expire. The Executive Secretary shall notify the Chairman of the Council thirty (30) days before the expiration of the term of any director. The Council Chairman may make interim appointments to fill unexpected vacancies.

AMENDMENTS

28. The Board of Directors by majority vote of those present at a meeting or by letter vote may make amendments to these By-Laws.

INSIGNIA

30. The insignia or emblem of the Association shall consist of:

a. The central figure is an alert powerful American eagle with strong talons clutching lightning flashes; —symbolic of a strong America insofar as national defense and especially modern communications are concerned—our basic reason for existence. The border consists of leaves of the olive branch of peace showing that the object of military preparedness in America is to assure a lasting peace. In the background are signal flags—the first means of signaling in the U. S. Signal Corps and a method still used for special purposes by the Navy. Just above the eagle and between his outstretched wings, is a heavy bomber in flight, symbolizing the complicated and essential communications in the Air Force, Marine and Naval aviation, both intra- and inter-aircraft, air-ground and on the ground. Above that is a radar antenna array and at the very top a radio relay antenna—for the latest major step in military communications. In the color version there are the traditional colors of the signal flags—dexter white flag with red center and sinister red flag with white center—with a gold border to the whole.

b. Insignia in this form with ribbon and modifications of it in the form of pins, badges, buttons and rings, shall be authorized by the Board of Directors for use of members. The ribbon shall be in two equally wide stripes of orange and blue.

30. The flag of the Association shall be the above insignia superimposed upon a field of sky blue cloth—representing the medium through which modern signals are transmitted. Under the insignia shall be a scroll on which shall be inscribed "National Security through Military Preparedness."

NATIONAL ADVISORY COMMITTEES

32. Members of the Association shall be eligible for membership on National Advisory Committees. These committees are in addition to local chapters and shall be devoted primarily to the advancement of knowledge, engineering practices and production and design techniques relating to special fields of communications or photography and to activities of the Association.

33. These committees shall be organized in conformity with conditions in each particular field rather than according to any standard pattern.

34. Each committee shall have a Chairman selected by the Board of Directors. The other members shall be designated by the Chairman. Through meetings, conferences and discussions and in cooperation with local chapters they shall keep the membership in close contact with progress and developments in their specific fields. They shall meet as committees from time to time to initiate recommendations or reports and shall be available in an advisory capacity on such matters as may be presented for their study and report by the armed forces or the Association.

ASSOCIATION AFFAIRS

(*Continued from page* 25)

his experienced and capable leadership the committee is expected to continue its work as a coordinating agency for the several Army, Navy and Air Force associations to the end that they may render greater service in the interest of military preparedness.

Col. King served for three years as chairman of the CCAFA. It was under his leadership that the annual Industry-Army Day meetings were arranged at Chicago in 1947, Dallas in 1948 and Boston in 1949, with regional meetings in Seattle and Omaha. He served during World War II as chemical officer on the staff of General J. Lawton Collins' famous VII Corps and was severely wounded in action during the Normandy fighting. He was awarded the Legion of Merit and the Purple Heart.

A rising vote of thanks was given to Col. King in appreciation of his energetic leadership and his initiative and vision during his chairmanship. Also, the new chairman was requested to express in writing to Col. King the appreciation of the committee and inform him that he is a charter life member of CCAFA.

A discussion was had of the forthcoming orientation and inspection trip for 80 civilians chosen from industry, education, religion, press and other phases of civic life. It was suggested that the presidents or other representatives of the military associations should be invited to participate in one of these trips (to be arranged a few weeks after the one under discussion.) The chairman was requested to recommend to the Secretary of Defense that invitations be extended to the associations at the appropriate time.

At the regular meeting October 17th, Chairman Codd was directed to determine from the Secretary of Defense whether he desires to continue the annual Industry-Army conferences or to replace them with an Industry-Armed Forces conference to be held this year at New Orleans in the early spring. The decision will be included with other information on the subject in a special newsletter to be published soon.

Lack to Johnson

On September 8th, AFCA President Lack wrote as follows to Secretary of Defense Johnson:

"The announcement of your recent appointment of a director of communications-electronics, to coordinate communications activities in the three services, and your statement that you are determined that our military people shall learn to know their opposite numbers, makes this an appropriate time for me to offer the services of our association to assist you in any way we can to improve military communications. Our annual meeting as well as frequent chapter meetings are our principal means of assisting the communications and photographic members of the services to know one another personally and professionally—one of our principal objectives as set forth in the enclosed booklet. Our members, both individual and group, are at your disposal to assist in any way we can in the communications and photographic fields."

The Secretary has indicated his appreciation of the offer and the newly appointed director of communications-electronics, Maj. Gen. H. M. McClelland, says he expects to take advantage of it.

Advisory Functions

AFCA's executive director recently contacted the National War College, the Industrial College of the Armed Forces, the Air Force deputy chief of staff, materiel, and appropriate advisory committees of the Munitions Board and the National Security Resources Board concerning the availability of our association or any of its members for such assistance as we may be able to supply them.

Charter Members, AFCA

We are publishing a list of the charter individual members of our association—those who joined before September 1, 1946. Many of these are life members, some have not continued as active members, many have moved and

not sent new addresses—especially officers and enlisted men who were overseas. These are the pioneers of our effort to help keep America strong in military communications and photography.

History Will Note Drew Field

Many of our readers who served at Drew Field, Florida, will be interested to know that Dr. Dulany Terrett, who is writing the Signal Corps history, says, "Drew Field is certain to receive full notice in anything we write, for that was a valuable activity." The same indication that the vast training activities there will receive proper attention has been made by the Air Force historians.

Chapter of the Year Contest

The Fort Monmouth Chapter has moved up among the leaders in the race for Chapter of the Year. The membership drive organized by former president Tully and vice-president Herrlein and directed by Col. A. D. Stephenson, committee chairman, had resulted in an increase in membership of about 100% when we went to press two weeks after the drive started.

ROTC Prizes

Medals and other prizes are being awarded in 1949-50 to ROTC cadets who excel in leadership and electronics in Army, Navy or Air Force units. Awards will be made next spring to the following colleges which have qualified for the awards:

A&M College of Texas
Carnegie Institute of Technology
Cornell University
Georgia Institute of Technology
Iowa State College
Massachusetts Institute of Technology
Michigan State College
New York University
North Carolina State College of A&E
Ohio State University
Oklahoma A&M College
Oregon State College
Rensselaer Polytechnic Institute
Rutgers University
Southern Methodist University
State College of Washington
Texas Technological College
University of Alabama
University of California
University of Florida
University of Maine
University of Miami, Fla.
University of Tennessee
University of Texas
University of Wisconsin
University of Wyoming
Virginia Polytechnic Institute

In addition to these awards, prizes will be given to the USMA, USNA and the Air Academy (if and when such an academy is established) and to the communications ROTC camp winner.

INDUSTRIAL MINUTE MEN OF 1949

Communications—Electronics—Photography

Listed below are the names of the American firms who are group members the Armed Forces Communications Association. By their membership th indicate their readiness for their share in industry's part in national securit Each firm nominates several of its key employees or officials for individu membership in AFCA, thus forming a group of the highest trained men in t electronics and photographic fields, available for advice and assistance to t armed services on research, development, manufacturing, procurement, a operation in our special fields.

Acme Telecronix
American Institute of Electrical Engineers
American Phenolic Corporation
American Radio Institute, Inc.
American Radio Relay League
American Steel & Wire Company
American Telephone & Telegraph Co.
Anaconda Wire & Cable Company
Arnold Engineering Company
Astatic Corporation
Automatic Electric Company
Automatic Electric Sales Corp.

Baltimore News Post
Baltimore Radio Show, Inc.
Barry Corporation, The
Bell Telephone Company of Pa.
Bendix Radio
Bliley Electric Company
Breeze Corporation, Inc.
Burnell & Company

California Water & Telephone Co.
Capitol Radio Engineering Inst., Inc.
Carolina Telephone & Telegraph Co.
Central Radio and Television Schools
Chesapeake & Potomac Tel. Co.
Cincinnati & Suburban Bell Tel. Co.
Collins Radio Company
Copperweld Steel Company
Cornell-Dubilier Electric Corp.
Corning Glass Works
Coyne Electric School, Inc.

DeJur-Amsco Corporation
Diamond State Telephone Co.

Eastman Kodak Company
Hugh H. Eby, Inc.
Electronic Associates, Inc.
Electronic Designs, Inc.
Espey Manufacturing Co., Inc.

Federal Mfg. and Engineering Corp.
Federal Telephone & Radio Corp.

General Aniline & Film Corp.
General Cable Corporation
General Electric Company
General Instrument Corp.
General Telephone Corp.
Gilfillan Bros. Inc.
Gray Manufacturing Co.

Hallicrafters Company
Haloid Company
Hazeltine Electronics Corp.
Heinemann Electric Company
Hercules Motors Corp.
Hoffman Radio Corp.

Ilex Optical Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
Institute of Radio Engineers
International Resistance Co.
International Tel. & Tel. Corp.

Jacobsen Manufacturing Co.

Kellogg Switchboard & Supply Co.
Kleinschmidt Laboratories, Inc.

Lasting Products Co.
Lavoie Laboratories
Leich Sales Corporation

Machlett Laboratories, Inc.
Magnavox Company
P. R. Mallory & Co., Inc.
Massachusetts Radio & Telegraph School
Merit Coil and Transformer Corp.
Michigan Bell Telephone Company
Mines Equipment Company
Motorola, Inc.
Mountain State Tel. & Tel. Co.

National Carbon Company, Inc.
New England Tel. & Tel. Co.
New Jersey Bell Telephone Compan
New York Telephone Company
North American Philips Co., Inc.
Northwestern Bell Telephone Co.

Oak Manufacturing Co.
Ohio Bell Telephone Co.
O'Keefe & Merritt Company
Operadio Manufacturing Company

Pacific Telephone & Telegraph Co.
Philco Corporation
Photographic Society of America

Radiart Corporation
Radio Condenser Company
Radio Corporation of America
RCA Victor Division
Ray-O-Vac Company
Reeves Instrument Corp.
Remington Rand, Inc.
Rola Company, Inc.

Sherron Electronics Co.
Society of Motion Picture Engineers
Sonotone Corporation
Southern Bell Tel. & Tel. Co.
Southern New England Tel. Co.
Southwestern Bell Telephone Co.
Sperry Gyroscope Company
Stackpole Carbon Company
Stewart-Warner Corporation
Stupakoff Ceramic & Mfg. Co.
Sylvania Electric Products, Inc.

Telephone Services, Inc.
Telephonics Corporation
Teletype Corporation
Times Facsimile Corporation
Tri-State College
Tung-Sol Lamp Work, Inc.

United Radio Television Institute
United States Electric Mfg. Corp.
United States Rubber Company

Western Electric Company, Inc.
Western Union Telegraph Co.
Westinghouse Electric Corp.
Weston Electrical Instrument Corp.
Willard Storage Battery Co.
Wisconsin Telephone Company
Wollensak Optical Company

CHAPTER NEWS

National Director of Chapters: Theodore S. Gary, 1033 W. Van Buren St., Chicago, Ill.

AREA REPRESENTATIVES FOR CHAPTERS

Area A: Col. George P. Dixon, IT&T Corp., 67 Broad St., New York, N. Y. *New England States, New York, New Jersey*

Area B: Col. J. H. LaBrum, Packard Building, Philadelphia, Pa. *Delaware, Kentucky, Maryland, Ohio, Pennsylvania, West Virginia and Virginia*

Area C: W. H. Mansfield, So. Bell T&T Co., Atlanta Ga. *Southeastern States along Atlantic and Gulf coasts—from North Carolina to Louisiana including Tennessee*

Area D: Col. H. L. Reynolds, 1800 N. Market St., Dallas, Tex. *New Mexico, Texas, Oklahoma, Arkansas*

Area E: T. S. Gary, 1033 W. Van Buren St., Chicago, Ill. *Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Colorado*

Area F: H. L. Hoffman, 3761 S. Hill St., Los Angeles, Calif. *Arizona, Utah, Nevada, California, Idaho, Oregon, Montana and Washington*

Individuals interested in chapter activities should communicate either directly with National Headquarters or with the proper area representative.

CHAPTERS AND SECRETARIES

ATLANTA: Capt. Dewey Allread, Jr., Bldg. 104, Apt. 1, Ft. McPherson, Ga.

AUGUSTA-CAMP GORDON: Maj. Norman J. Kinley, SCTC, Camp Gordon, Ga.

BALTIMORE: Col. Henry W. Williams, 3953 Cloverhill Rd., Baltimore 1, Md.

BOSTON: Lt. Col. Edmund T. Bullock, Boston Army Base, Boston 10, Mass.

CHICAGO: Col. Raymond K. Fried, 111 W. Monroe St., Chicago 1, Ill.

CLEVELAND: T. F. Peterson, 1434 Union Commerce Bldg., Cleveland 1, Ohio.

DALLAS: Col. E. H. Mittanck, Rm. 816, Telephone Bldg., Dallas, Tex.

DAYTON: Gertrude A. Knight, 54 Patterson Village Dr., Dayton, Ohio.

DECATUR: Doris E. Short, 140 No. Hilton St., Decatur, Ill.

EUROPEAN: C. E. Laurendine, Comm. Gp., BiPartite Control Office, Frankfurt, APO 757, New York.

FAR EAST: Lt. Col. Roy F. Blackmon, Sig. Sec., GHQ., FEC, APO 500, c/o PM, San Francisco, Calif.

FORT MONMOUTH: Maj. T. H. Giles, SigC Bd., Fort Monmouth, N. J.

GREATER DETROIT: Robert J. Derr, 20038 Pinehurst Ave., Detroit, Mich.

KENTUCKY: Clyde T. Burke, Lexington Signal Depot, Lexington, Ky.

LOUISIANA: Col. A. Bruce Hay, Southern Bell Tel. & Tel. Co., New Orleans, La.

NEW YORK: Col. William H. Harrington, 195 Broadway, New York 7, N. Y.

OGDEN-SALT LAKE: Inactive.

PHILADELPHIA: Joseph Bergman, Sig. Corps Stock Control Agency, 2800 So. 20th St., Philadelphia, Pa.

PITTSBURGH: Sylvester C. Stoehr, Jr., 201 E. Main St., Carnegie, Pa.

RICHMOND: Lelia V. Fussell, Ches. & Potomac Tel. Co., 703 E. Grace St., Richmond, Va.

SACRAMENTO: Capt. C. A. House, Sacramento Signal Depot, Sacramento, Calif.

SAN FRANCISCO: Col. J. K. Fairchild, 55 Madrone, Fairfax, Calif.

ST. LOUIS: A. Reid Chappell, 70 York Drive, Brentwood, Mo.

SEATTLE: Clarence C. Bodine, 6812 Phinney Av., Seattle, Wash.

SOUTH CAROLINA: John A. Norman, Southern Bell T&T Co., Columbia, S. C.

SOUTHERN CALIFORNIA: Col. K. E. Lambert, MGM, Hollywood, Calif.

SPANISH WAR VETERANS DIVISION: George A. Marshall, Adj., 215 Montague St., Brooklyn, N. Y.

WASHINGTON: Col. Edward C. Cover, Chesapeake & Potomac Tel. Co., 725 - 13th Street, N. W., Washington, D. C.

STUDENT CHAPTERS

CORNELL: John M. Ross, 126 McFaddin Hall, Ithaca, N. Y.

NEW YORK UNIVERSITY: Robert D. Hawkins, 25 Spruce Ave., Ridgefield Park, N. J.

OKLAHOMA A & M: W. D. Manahan, Okla. A & M College, Stillwater, Okla.

STATE COLLEGE OF WASHINGTON: Stuart W. McElhenny, 604 California St., Pullman, Wash.

TEXAS TECH: M. G. Harris, Texas Tech, Lubbock, Tex.

UNIVERSITY OF CALIFORNIA: R. G. Barhite, Bowles Hall, U. of Calif., Berkeley, Calif.

NATIONAL HEADQUARTERS CHAPTERS SECRETARY: JULIA B. GODFREY

Atlanta—W. H. Mansfield, Pres.

Atlanta was the third chapter to hear Dr. J. O. Perrine, assistant vice president of the American Telephone and Telegraph Company, deliver his demonstration-lecture on "Micro-Radio Waves in Civil and Military Communications." Dr. Perrine addressed the chapter at its annual fall dinner-meeting on September 6th at the officers' club, Fort McPherson. He was introduced to the assembly by Mr. Hal S. Dumas, president of Southern Bell Telephone and Telegraph Company. Chapter president Mansfield, who had arranged for Dr. Perrine's appearance before the four Southern chapters, acted as toastmaster.

Chapter Of The Year, 1949

KENTUCKY

President—Murray P. McQuown

Past Pres.—William M. Mack

Secretary—Clyde T. Burke

Among the 150 members and guests at the meeting were: Lt. Gen. Alvin C. Gillem, commanding general, Third Army; Maj. Gen. Paul J. Mueller, deputy commanding general, Third Army; Maj. Gen. William C. Chase, chief of staff, Third Army; Col. Frank Ward, deputy post commander, Fort McPherson; Col. R. P. Lyman, signal officer, Third Army; Brig. Gen. William L. Plummer, USAFR; Lt. Col. George H. Kneen, commanding officer, Marietta Air Force Base; Capt. E. C. Parker, USN, commanding officer, U. S. Naval Air Station, Atlanta; Mr. J. G. Bradbury, executive vice president, Southern Bell Telephone and Telegraph Company; and Mr. Dan A. McKeever, past president of the chapter.

Augusta-Camp Gordon—H. A. Fleming, Pres.

Dr. Perrine's appearance before the Augusta-Camp Gordon Chapter on September 1st drew a record audience

of 650 at Theater No. 1, Camp Gordon. The local press reported it as "one of the most amazing demonstrations ever seen here of the progress being made in the transmission of electrical energy and the transformation of this force into light and sound."

Prior to the lecture, Dr. Perrine was guest of honor at a dinner given by the chapter at the Camp Gordon officers' club.

The October meeting was held at the Signal Corps training center demonstrator on October 26th. Visitors introduced by President Fleming included Col. H. A. Vest, communications officer, Third Army; Col. Leroy, executive officer, Augusta Arsenal; and Capt. A. B. Gibson, the chapter's only life member, who was attending his first meeting with the chapter.

At the close of the business session, Capt. Claude E. Leslie, officer in charge of the demonstrator building, gave an account of the various uses to which the building is put, following which the equipment was demonstrated by the enlisted staff attached to the building. A short Signal Corps movie was also shown.

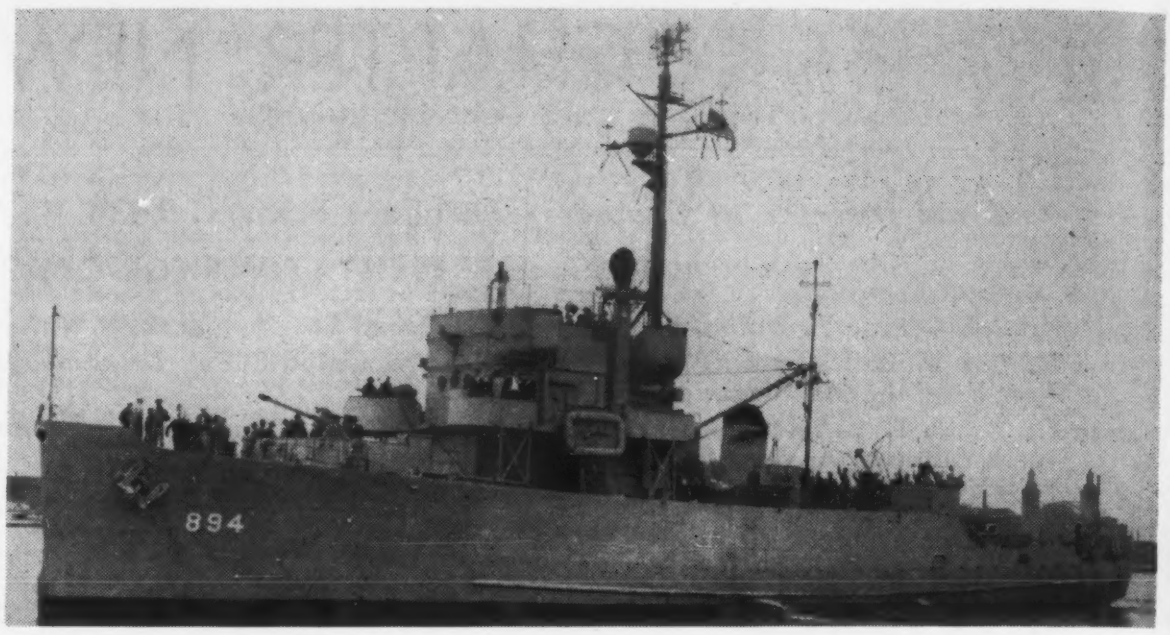
Baltimore—E. K. Jett, Vice-Pres.

After adjournment during the summer months the Baltimore Chapter resumed its activities with a series of visits to various facilities within its area. Mr. F. E. Moran, who was re-elected chapter president in June, has been transferred to Pittsburgh. Vice-President Jett is serving as temporary chairman until a new president is chosen.

The first fall meeting was held at Fort George G. Meade on September 14th. After the business meeting and dinner at the battalion mess, 51st Signal Operation Battalion, visits were made to the communication center, military amateur radio station and photographic laboratory and library. A display of tactical equipment of the 51st Signal Operation Battalion, including the modern An/MSC-1, mobile signal communication center, rounded out the evening's activities.

The U. S. Naval Academy was the scene of the October meeting. After dinner at the officers' club, the members attended a lecture on electronics and electricity as covered in the Naval Academy course. This was followed by a visit to the electrical engineering laboratory for various demonstrations.

The program was arranged by Rear Admiral James L. Holloway, Jr., Superintendent of the Naval Academy; Capt. William R. Smedberg, head of the Academy's department of electrical engineering; and Capt. Richard E. Elliott, commanding officer of the U.S. Navy Communication Station, Annapolis.



Chicago chapter members ride Navy PCE 894 from the Naval Armory (off downtown Chicago) to U. S. Naval Training Center, Great Lakes, for tour of the center's electronics school.

The Chesapeake and Potomac Telephone Company was host to the chapter for its November meeting. The members met for dinner at the company's headquarters building in Baltimore, and then participated in the excellent program arranged by telephone company officials. Preparatory to a tour of the headquarters building, Mr. William E. Purdue, plant extensions engineer, gave a talk on "Nationwide toll dialing." The group then inspected the equipment being installed which will tie Baltimore into the nationwide toll dialing layout. Other interesting exhibits included a cable splicer performing the intricate operation of splicing a telephone cable containing several hundred pairs of wires.

Chicago—O. Read, Pres.

Since its reorganization in May, the Chicago Chapter has taken its place in the front line as a vital unit of the association. The U. S. Naval Training Center, Great Lakes, was the scene of its September 21st meeting. Through the courtesy of Capt. Valvin R. Sinclair, USN, inspector instructor of Chicago and Evanston Naval Schools, a destroyer escort vessel was provided to transport 100 members and guests to the Great Lakes base. The PCE 894, under command of Lt. H. E. Graven, USN, left Naval Armory in Chicago in mid-afternoon, arriving at Great Lakes in time for a tour of the base before dinner at the officers' club.

Chapter president Oliver Read presided at the meeting, introducing as speakers U. S. naval experts on electronics supply and electronics training. Capt. W. M. Foster keynoted the meeting with a short talk on the naval objective of making as easy as possible the work of firms supplying new and old items of equipment. Commander C. R. Eagle, Jr., executive officer of the electronics supply office, briefly outlined the facts about the purchasing office and indicated high points of interest to be seen in the tour after the meeting. Commander A. B. Chase described some of his problems as technical officer of the electronics supply office. Lt. Commander N. A. Garretty, officer in charge of the electronics technicians school, gave facts about the installation for training of maintenance men on radar, sonar, and communication equipment. He said that the training of operators is done largely in fleet operations at sea.

After the talks, the meeting was adjourned to form convenient groups to tour the supply office and the training school. The cross-referencing of specifications and supplies' catalog information was impressive at the supply office. The training school equipment was spectacular in its twelve million dollar installation designed to graduate 250-300 men per month with a 42-week course of instruction.

The facilities of the Hallicrafters Company were made available to the chapter for its meeting on October 26th. Mr. William J. Halligan, president of Hallicrafters and AFCA director at large, was host at cocktails prior to the dinner.

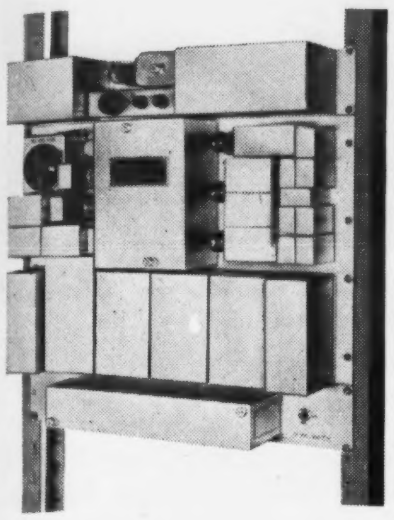
Short talks were given by two Hallicrafters engineers: Mr. Charles Honeywell, chief television engineer, spoke on "color television," and Mr. Harold Rensch, project engineer, discussed "citizens' radio." This was followed by a Signal Corps sound film entitled "Attack Signal," which had been released for showing to the group through the courtesy of Col. Glenn H. Palmer, chief signal officer, Fifth Army.

Mr. Honeywell's talk summarized the current important details of color television. He pointed out that two possible color systems are being considered, a CBS improved mechanical filter disk combination, and an RCA all electronic system, and that FCC hearings are being held to weigh the merits of each system.

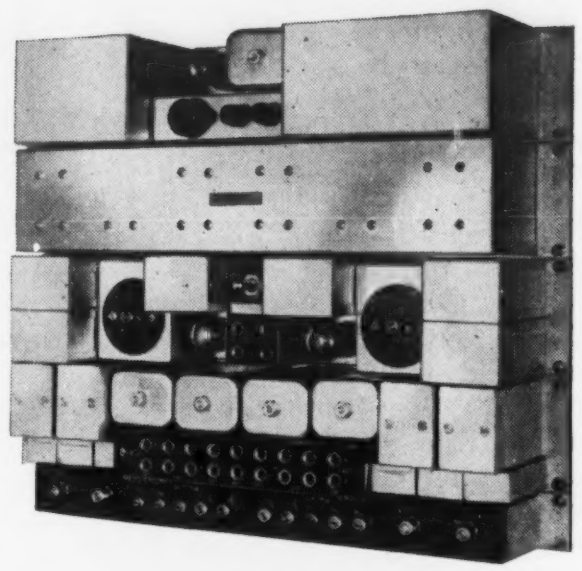
Mr. Rensch, in his talk, explained some of the details of "citizen's radio," the civilian equivalent of walkie-talkie. He stated that the compact set, being manufactured by Hallicrafters, is good for communication up to 1.2 miles when

For Economy – Dependability – Versatility Your Best Buy is KELLOGG

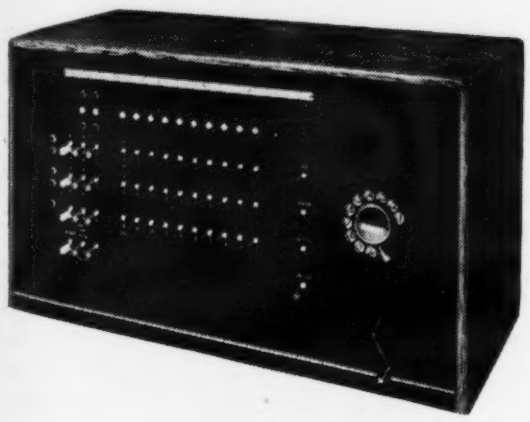
Kellogg No. 5 Carrier



Type No. 5A Carrier Systems are designed to provide additional circuits over existing voice-frequency lines without an increase in outside plant facilities. The flexibility and portability of this Kellogg Carrier makes it ideally suited for meeting heavy seasonal demands and for temporary or emergency use in addition to its normal use as a dependable round-the-clock permanent circuit facility. Can operate through 30 db and on a ring down basis range of operation is not limited by signalling capacities. Simple to set up and easy to maintain. No frequency adjustment or synchronization procedures necessary.



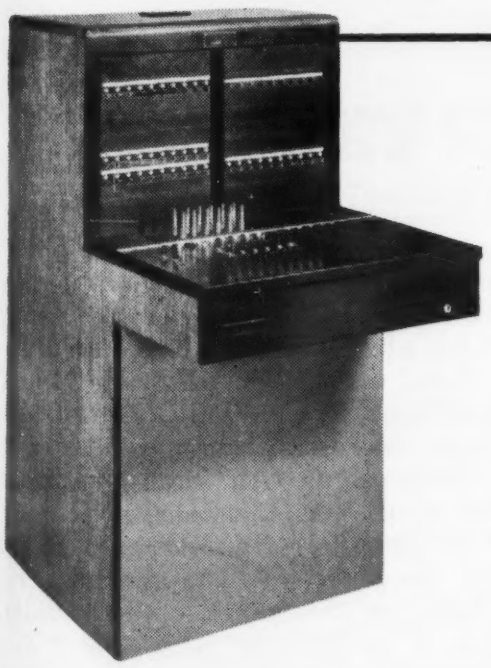
The New Universal Cordless PBX



The **only** board that may be used **Universally** on common battery, manual or dial, or magneto main exchanges without expensive time consuming modifications. Adding a dial or "strapping-in" additional circuits require only a few minutes. Arranged for either through or blocked supervision. Contact your Kellogg representative for details of this Universal Cordless PBX board. It may be ordered already strapped for various types of service.

Kellogg No. 4 Repeater

Kellogg Voice Frequency Telephone Repeaters are used to increase transmission levels on long or highly attenuated telephone circuits. Kellogg Repeaters are assembled and wired on a unit basis for greater flexibility. Accurately-calibrated controls allow quick, easy changes when line conditions vary. Each unit mounts on a standard 19" relay rack or in a cabinet.



Masterbuilt "K" Type PBX Switchboard

This all-purpose Kellogg switchboard employs the same cord and trunk circuits whether for manual or dial operation and can connect to any type of central office equipment. When connected to dial exchange it provides both through and attendant dialing. Ask your Kellogg representative to give you full details about this and other PBX switchboards designed to fit a wide variety of requirements.

Kellogg Key-BX System

Kellogg Key-BX Systems provide specialized telephone service without the need for a switchboard attendant. Every person has access to incoming and outgoing lines or can signal and talk to anyone else on the system when intercommunication is needed. Available in many sizes and combinations to meet varying needs. Write today for a new bulletin No. 846.

Kellogg Masterphone

Telephone men say this smartly styled, sturdily built Kellogg Masterphone is today's best buy because of its high effective transmission rating. Wall and desk sets mount on one base plate and slide-link switches provide easy universal circuit applications.

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

Established 1897

TELEPHONE EQUIPMENT

6650 SOUTH CICERO AVENUE • CHICAGO

hand carried in level country. With the antenna at a 33 foot elevation up to 7 miles can be realized, he said, and in hilly country operation from peak to peak is possible up to 30 miles.

An inspection tour of the Hallicrafters' plant concluded the evenings program. The chapter visitors expressed particular interest in the assembly of television receivers on a production line basis in the plant.

The Coast Guard's Cleveland lifeboat station was meeting place recently for Cleveland chapter. Members were taken by small boat to visit installations out in Lake Erie.

Cleveland—Col. L. J. Shaffer, Pres.

The first meeting of the 1949-50 season was held October 13th, at the Coast Guard's Cleveland lifeboat station on Lake Erie. Bosn. W. H. Wilmot, commander of the station, greeted President Shaffer and other chapter members in the station lounge. A thoroughly interesting talk on "electronics as applied to navigation" followed in the auditorium by Lt. H. E. DeLong, electronics officer at Coast Guard headquarters in Cleveland. After a trip to the top of the tower to examine equipment used in these electronics aids, all hands were taken by small boat out into the lake to visit additional installations there. The entire program was of genuine value to the members present.

Brig. Gen. S. H. Sherrill, National Executive Director, who came from Washington for the meeting, spoke informally to the group. He outlined progress made by the association and offered several suggestions to increase the membership of the local chapter so that it might better carry out its mission of bringing together to their mutual benefit all the Army, Navy, Air Force, Marine and Coast Guard and civilian personnel engaged in communications and photographic activities in the area. He spoke especially of Coast Guard participation, pointing out that the chief of communications for the Coast Guard, Capt. D. E. McKay in Washington, had stated that our organization, by carrying out its objectives "cannot fail to contribute to our preparedness and national security."

In the evening, the chapter officers met with General Sherrill in a conference at which association matters, especially the 1950 national meeting, were discussed.

The November meeting was conducted jointly with the local units of the A.I.E.E. and the I. R. E. The featured speaker was Dr. T. T. Goldsmith, director of research of the Dumont Laboratories. His subject was "progress in ultrahigh frequency and colored television."

Far East—Brig. Gen. G. I. Back, Pres.

In his address before the annual meeting of the Tokyo Post. Far East Chapter, Lt. Gen. George E. Stratemeyer, Far East Air Forces commander, pointed out: "For an Air Force commander to be successful, he must have communications. He fails without them. All of us know there is a need for constant research of communications methods during peacetime."

He further stated: "An organization such as yours can be of great help, not only to the Air Force, but to all branches of the Armed Forces in their efforts to progress in communications by providing maximum management and research for the lowest cost to the taxpayer. The Air Force is particularly interested in applying the principles of good business to its overall operations in view of economy and this touches the complex field of communications as well as other supporting services to the U. S. Air Force." . . . . ."An address such as I have been privileged to give tonight would not be complete without paying tribute to the communications and electronics industry and all the personnel concerned who have played such a vital part in developing the facilities which we almost take for granted these days. We know that their laboratories of research are constantly developing and turning out new means of communication. Let us hope their achievements will be for peace. However, we also know that if called upon in case of an emergency, they will be ready, as before, to play their part in the team of victory."

The meeting took place at the Union Club, Tokyo, on June 30th, under the sponsorship of the Air Force members of the post. Brig. Gen. George I. Back, president of the Far East Chapter, opened the meeting by welcoming the two hundred members and guests present.

Following General Stratemeyer's address, a radio teleconference demonstration was staged, employing the standard visual screens so that all present were able to read incoming and outgoing messages as they were received and sent. The circuit terminals were Tokyo and Washington, D. C. The initial message was sent by Mr. Frederick R. Lack, president of AFCA. Further messages were exchanged with Brig. Gen. S. H. Sherrill, AFCA Executive Director; Maj. Gen. S. B. Akin, Chief Signal Officer; Rear Admiral Earl E. Stone, Chief of Naval Communications; Maj. Gen. F. L. Ankenbrandt, Director of Communications, USAF; Maj. Gen. H. M. McClelland, Deputy Commander of Services, MATS; Brig. Gen. W. G. Smith, Commanding General, AACS, Washington, D. C.; and Brig. Gen. Wesley T. Guest, Chief, Army Communications Service.

Fort Monmouth—Col. J. D. O'Connell, Pres.

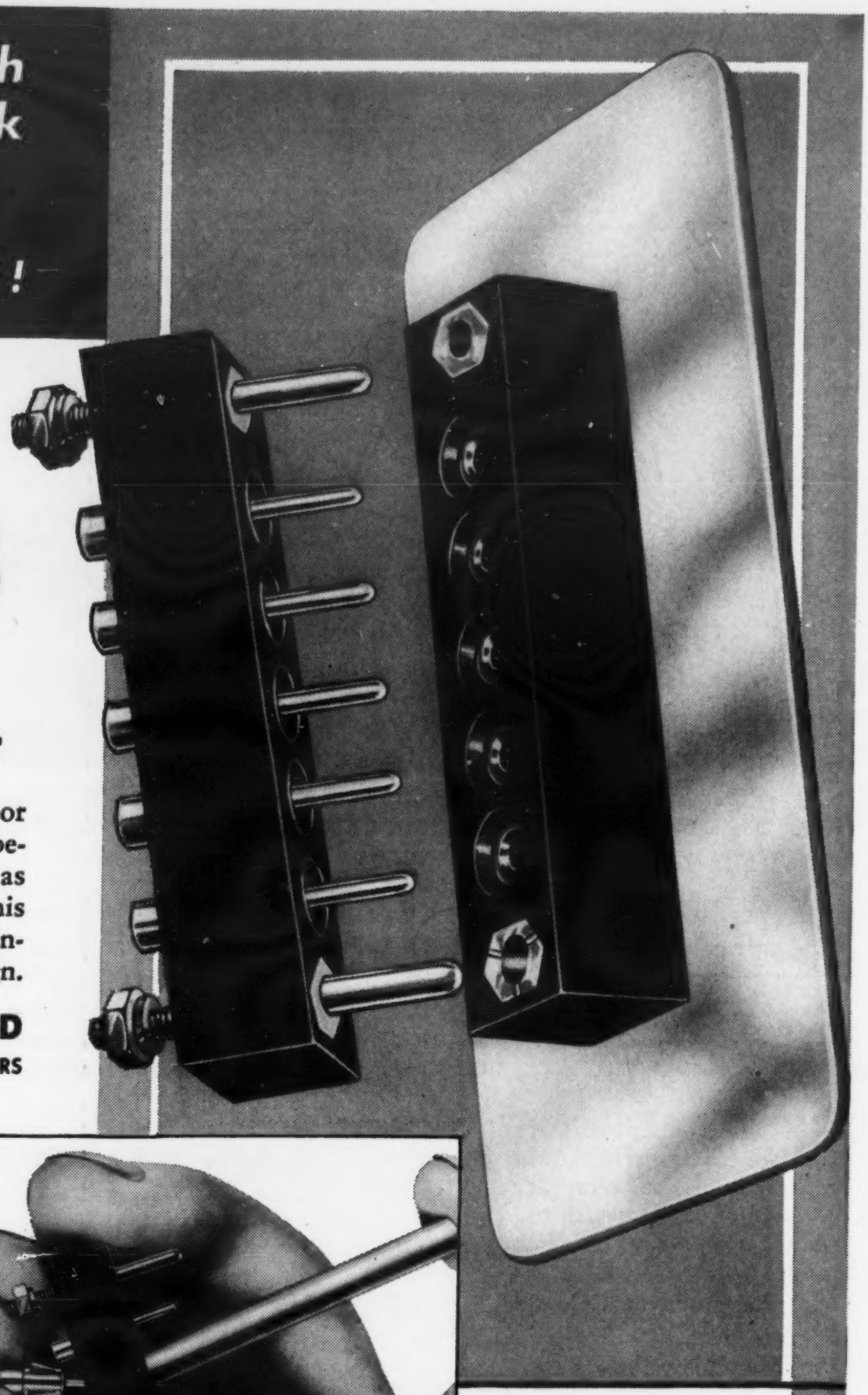
In September, Col. Terence J. Tully was elected president of the chapter to succeed Col. Louis J. Tatom who had been transferred overseas. After several conferences in Washington with Brig. Gen. S. H. Sherrill, AFCA Executive Director, Col. Tully formulated plans for increasing chapter activities and membership. An intensive membership drive was put into motion on October 24th and resulted in a flood of new members. A chapter meeting was held on November 16th (details to appear in the next issue), and arrangements are well underway for the AFCA 1950 annual meeting which will be sponsored by both the Fort Monmouth and New York Chapters next spring.

In November, the chapter again had a change in leadership. Col. Tully was transferred to London and Col. James D. O'Connell was chosen as his successor. Col. O'Connell was active in the Far East Chapter of the asso-

If You Have a Tough Connector Problem, Ask

BREEZE

FOR THE ANSWER!



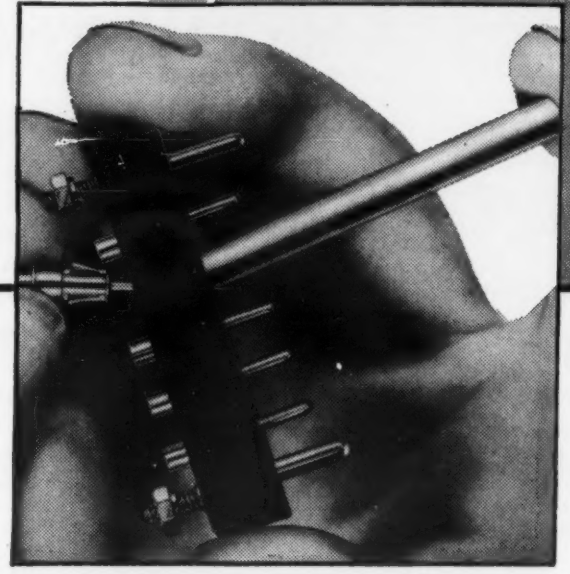
SPECIAL CONNECTORS

for advanced radar and electronic equipment

Where electrical connector requirements are strict, or the job specialized, take advantage of Breeze experience. Breeze has engineered such advantages as removable contacts for panel-type connectors. This exclusive feature greatly simplifies wiring and maintenance, and is typical of advanced Breeze design.

PRESSURE-SEALED
OR WATER-TIGHT CONNECTORS

Engineered to specification in aluminum, brass, or steel. All sizes, capacities. High voltage pulse type connectors. Also rotary shaft seals and allied equipment. Write for details.

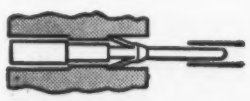


BREEZE "Monobloc Miniatures" (above) come in 5, 10, 15, and 20 contact sizes or multiples thereof. Capacity—10 amperes with 7 millivolt drop; 500 volts DC or 275 volts AC.

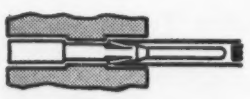
REMOVABLE CONTACTS

Save Time, Trouble, Confusion

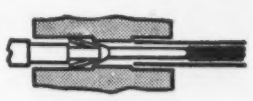
Simple tool (right) removes contacts for bench soldering. Production time reduced, close work eliminated, errors avoided. Contacts simply snap back into block.



Contact retained securely in block by two spring locks.



Tubular tool inserted from contact side to close springs.



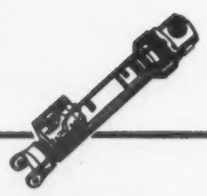
Contact easily removed, but cannot come loose in service.

LOOK TO THE BREEZE MARK FOR QUALITY

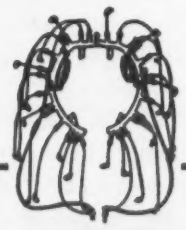
BREEZE CORPORATIONS, INC.

41-E South Sixth Street Newark 7, New Jersey

Other Breeze Precision Products



ACTUATORS: All types, sizes. Complete control systems engineered to requirements. Above: Landing gear actuator, Fairchild Packet.



RADIO SHIELDING: For any type of high or low tension system. New type "unit leads" or re-wirable leads. Flexible shielded conduit.

"AERO-SEAL" Worm-Drive Hose Clamps. Vibration proof, uniform clamping, use again and again. Cadmium plated or stainless steel.

Dr. J. O. Perrine, assistant vice president of American Telephone & Telegraph Co., visited several Southern chapters of AFCA recently, delivering demonstration-lectures on "Micro-Radio Waves in Civil and Military Communications."

CHAPTER NEWS

ciation while on duty as signal officer of the Eighth Army.

The other chapter officers are: Lt. Col. W. R. Herrlein, vice-president; Maj. T. H. Giles, secretary; and Miss Florence Adair, treasurer.

Maj. Gen. Francis Lanahan, commanding general, Fort Monmouth, issued the following statement in connection with the chapter's drive for increased membership:

"The Fort Monmouth Chapter of the Armed Forces Communications Association is presently being reorganized in order to prepare itself to assist in the arrangements for the national convention of the association which is scheduled for Fort Monmouth in May 1950. Most of the senior officers and noncommissioned officers, as well as our key civilians in the Signal Corps, understand the basic purpose of this particular organization which is essentially to preserve and promote the spirit of friendship and cooperation that existed during World War II in the production of the magnificent results in communications. Unless some such organization is in being, the personal relationships tend to weaken or separate over the years.

"The Fort Monmouth Chapter of the association is planning an active, interesting, and worthwhile program for the future. You have the opportunity of joining this organization and participating in its activities. Committee members of your chapter are ready and anxious to discuss the purposes of the association and to outline their plans for meetings and programs in your area. Talk to them and give serious consideration to the part you can play in our national defense effort by becoming a member of the Armed Forces Communications Association."

Greater Detroit—R. J. McElroy, Pres.

Col. George W. Goddard, USAF, presented his lecture-demonstration of the Air Force's tri-dimensional photography show to an enthusiastic audience at the chapter's first fall meeting, which took place on October 6th at the Detroit News-WWJ Auditorium.

Mr. T. S. Gary, AFCA National Director in charge of chapters, came from Chicago to attend the meeting and to make formal presentation of the chapter charter to President McElroy.

Kentucky—M. P. McQuown, Pres. 1949 Chapter of the Year

"Communications as a crime stopper" was the topic of the October 14th meeting of the Kentucky Chapter. Some 85 members and guests met at the officers' club of the Lexington Signal Depot at 4 P.M. for an informal get-together, followed by a buffet supper at 6:30. At the close of the business meeting, President McQuown introduced Mr. Guthrie Crowe, Commissioner of Kentucky State Police, who gave a brief talk on the organization of the communications department of the Kentucky State Police. He then presented Mr. Henry C. Hall, communications chief of the State Police. With the aid of a large map of Kentucky on which the police network was illustrated with colored lights, Mr. Hall explained the operation and illustrated how the state network tied in with the Army radio network and networks in other states. At the close of the talk, the members adjourned outside the club for a demonstration of a Kentucky State Police car equipped with the latest in communications equipment.

After the demonstration, moving pictures of the Kentucky-Mississippi football game were shown.

The November meeting took place at the Phoenix Hotel in Lexington on November 10th. After dinner the members heard a stimulating talk on "political preparedness" by Dr. H. W. Hargreaves, professor of economics at the University of Kentucky.

New York—Col. G. P. Dixon, Pres.

The New York Chapter's opening meeting of the 1949-50 season will be remembered by the large group of members and guests attending, not only for the excellent facilities provided by the officers' club of the Brooklyn Navy Yard but because it was the chapter's first real Navy night.

The guest of honor, Rear Admiral John R. Redman, new Chief of Naval Communications, came from Washington for the occasion and delivered an excellent talk on naval communications as well as on his previous assignment with the "moth-ball" fleet. Capt. Roy Graham, USN, Chief of Staff, Eastern Sea Frontier, arranged for the presentation of a film graphically depicting the war in the Pacific. Informal talks by AFCA National President Fred Lack, Maj. Gen. H. C. Ingles, World War II Chief Signal Officer, and others, contributed to a pleasant after dinner period. The club's fine accomodations for handling such a large group, the ample refreshments plus a very good dinner also contributed a great deal towards making this—the chapter's first meeting on the home grounds of the Navy—a marked success.

A committee for nominating officers and directors for the coming year was announced by President Dixon. This committee, representing the various membership components of the chapter —individual civilian members, group members and the three services—consists of Chairman George W. Bailey, Mr. Herbert Schroll, Brig. Gen. Samuel M. Thomas, Capt. W. G. H. Finch, and Brig. Gen. A. W. Marriner.

Philadelphia—Col. W. W. Watts, Pres.

President Watts and the members of the Philadelphia Chapter, especially the program committee, are to be congratulated on their November 2nd meeting at the Franklin Institute. It was one of the first meetings held jointly with other local societies since the

Magnetic Materials

The Arnold Engineering Company offers to the trade a complete line of Magnetic Materials

PERMANENT MAGNET MATERIALS

- Cast Magnets, Alnico I, II, III, IV, V, VI, XII, X-900
- Sintered Magnets, Alnico II, IV, V, VI, X-900, Remalloy*
- Vicalloy* • Remalloy* (Comol)
- Cunico • Cunife • Cast Cobalt Magnet Steel

HIGH PERMEABILITY MATERIALS

- Deltamax Toroidal Cores • Supermalloy* Toroidal Cores
- Powdered Molybdenum Permalloy* Toroidal Cores • Permendur*

*Manufactured under licensing arrangements with WESTERN ELECTRIC COMPANY

Write for information relating to any of these Magnetic Materials

THE ARNOLD ENGINEERING COMPANY

SUBSIDIARY OF ALLEGHENY LUDLUM STEEL CORPORATION

147 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS

suggestion was made in AFCA chapter letter of November 30, 1948, and should set the pattern for chapter meetings of this sort.

The Franklin Institute, which was founded in 1824, includes in its beautiful main building a museum. An interesting demonstration of an unconventional method of remote control has been given daily in the museum for over ten years. This is a remotely controlled boat which is the final stage of man's development of his methods of transportation over water, the other steps of which are illustrated in the excellent series of models illustrating the progress made since the daring Norsemen set the prows of their longships in the direction of the West. But it is more than a symbol of man's conquest of the ocean. It is an example of the beginnings of that new science with the fearsome name of "cybernetics," of which we are likely to hear so much in the future.

AFCA members, together with members of the Franklin Institute and the Institute of Aeronautical Sciences, which jointly sponsored the meeting, and honored guests, gathered at 6:30 P.M. in the Institute's dining hall. Among those at the head table, in addition to President Watts, were Dr. H. B. Allen, executive vice president of the Franklin Institute; Rear Admiral Roscoe E. Schuirmann, commander of the Fourth Naval District; Rear Admiral Earl E. Stone; Col. Albert Wolfe of the Institute of Aeronautical Sciences; Mr. Frederick R. Lack, national president of AFCA; Mr. Walter Evans, national director of AFCA from Baltimore; and Brig. Gen. S. H. Sherrill, AFCA Executive Director.

Immediately after dinner, those present examined some of the splendid exhibits of the institute and then gathered in the auditorium. Dr. Allen greeted the guests and introduced Col. Watts who presided at the meeting. After a brief outline of the objectives of AFCA and an expression of appreciation to the Franklin Institute for joining in sponsoring the meeting, he introduced Admiral Stone, the guest speaker, who was until recently Chief of Naval Communications and now has a special assignment with the joint chiefs of staff in Washington. Admiral Stone explained in a most interesting and detailed manner "Communications and Electronics—The Most Essential Tools of Joint Command." He said, in part:

"I know that one of our common problems in the three services today is to maintain adequate trained personnel to utilize effectively, and to maintain, the communications-electronics material that has already been provided. Military aircraft, surface ships, submarines and tanks, as well as many military establishments on shore throughout the world, such as communication stations, radar stations and D/F stations have important, and often very complex communications-electronics installations. Without trained personnel that equipment would be of no use—in fact it could even be a hindrance. Our emergency sources of trained personnel are of three main categories. There is the all-important communications-electronics industry, including the communication operating companies—and there are the many amateurs of the American Radio Relay League and the Military Amateur Radio System upon whom we know we can depend for their resourcefulness and unique "know how"—and there is our electronics reserve.

"Since the fighting forces must be readily controlled and directed, there must be effective communications. In fact, without adequate communications —no commander would willingly risk action against an able adversary. If a question exists in anyone's mind as to the absolute necessity for communications as well as other electronics to utilize air power and sea power, he may be reminded of the fact that big bombers would not leave their base and big carriers would not put to sea without reassurance that their respective complex communications-electronics installations were fully ready for use.

"In the joint communications-electronics field, unification is working very well indeed. There are common operating procedures in use in the three services, common communication instructions, common procurement procedures, a procedure for standardization of components of electronic equipment, and coordination of research and development. There are always bound to be some honest differences of opinion in such a complex field as military communications and electronics. But time and again such differences have been resolved satisfactorily among the chiefs of communications of the three services, and no doubt other problems will be so resolved in the future—by agreeing on what will be best for our national security.

"While striving for the utmost coordination in our military communications, it should be appreciated that the consolidation of communications cannot be carried to extremes since each military service has specific essential needs for combat communications that cannot be fused into a single unified communications service.

"It must be remembered that a primary purpose of unification is to improve operating efficiency and insure economy. However, individual service requirements will still be given full consideration in order, when practicable, to permit each service to exploit to the fullest any important advantage accruing to it by its nature or relative superiority. In determining what the composition of our unified military machine must be, in order to meet the most likely threats to our national security, it is necessary to relate weapons, forces, strategy and funds—so that the resulting three service fighting strength will be the greatest team strength that can be provided and maintained for the dollars which can be spent."

A showing of the film "Pro Patria Vigilans," the story of the Signal Corps' activities and accomplishments during World War II, followed. After the meeting, many of the 250 who attended spoke enthusiastically about the excellence of the program and its value to the membership committee which has Leslie Woods of Philco as its chairman.

The chapter's program committee, headed by Robert R. Rinkenback, which arranged the many details of the program, has scheduled Col. George A. Goddard, famed Air Force expert in photography, with his demonstration of three-dimension color strip photography for January.

Excellent publicity before and after the meeting in the Philadelphia papers was arranged by the publicity committee headed by Harry Ehle. It emphasized the fact that communications and electronics are the keys to battle success in the air, on the sea and the land.

Pittsburgh—E. J. Staubitz, Pres.

Dutch Henry's Restaurant in downtown Pittsburgh was the meeting-place of the chapter on Tuesday evening, October 11th. After dinner, Chapter President Staubitz introduced the new members present, discussed the status of the chapter and his hopes for its increased activities, and then introduced AFCA's National Executive Director, Brig. Gen. S. H. Sherrill, who had come on from Washington for the meeting. After remarking on his special interest in Pittsburgh because of his four year tour of duty at Carnegie Tech 25 years ago, General Sherrill outlined the progress made by AFCA since his talk to the founders of the chapter on an earlier visit in 1946. He explained that, after attending a special conference for association secretaries called by Secretary of Defense Johnson the preceding week, he believes the main mission of our association is to bring the communications, electronics and photography personnel closer together in the three armed services and in industry. In that way, the association can assist in solving varied problems posed by the services and the chapters can submit suggestions and recommendations to the Defense Department and all would mutually benefit. He feels that every American engaged in these activities should support AFCA and especially invited the students and instructors in ROTC at Carnegie Institute of Technology to participate in chapter activities. Major A. L. Hall, ROTC instructor at Carnegie Tech was present and indicated he expects considerable interest in the as-

NOW . . . CAPEHART TONE BRINGS TELEVISION TO LIFE!

Maestro WILFRED PELLETIER *of Metropolitan Opera Company*

Together, International Telephone and Telegraph Corporation and Capehart-Farnsworth Corporation bring you a new experience in television. For the first time, you enjoy *living sound* combined with a vivid image . . . to give you realism never before attained by any television receiver. Here is tone so full, so true it reproduces every shading of sound from whisper to whistle . . . from treble of flute to rumble of double-bass . . . Today, I T & T brings you Capehart television. Today, television comes to life . . . through Capehart *tone.*

I T & T

THERE'S MORE TO TELEVISION THAN MEETS THE EYE . . . WHEN YOU OWN A CAPEHART

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
New York, N. Y.

sociation and its award to the outstanding student at the college to be made next spring.

Past president Robert Disney spoke of his experiences in organizing the chapter and made several suggestions which should help in building it into the leadership that the city expects. Fred Moran, last year's president of the Baltimore Chapter, who has been transferred to Pittsburgh, was present as an honor guest. He outlined in considerable detail the procedures used at Baltimore in making it one of the outstanding chapters of the year, and indicated that he would continue his activity as a member of the Pittsburgh Chapter.

Before the meeting, President Staubitz and General Sherrill visited Carnegie Tech and conferred with Maj. Hall, Asst. PMS&T there and members of his staff about participation by ROTC and college personnel in the activities of the local chapter. The purposes of the AFCA awards to outstanding ROTC cadets were explained to the ROTC staff.

Sacramento—Col. M. G. Mauer, Pres.

A composite picture of "Local Military Signal and Communication Establishments" was presented at the September 27th meeting of the chapter at the Sacramento Signal Depot Officers' Club. Some 100 members and guests attended the meeting, as well as the cocktail party and turkey dinner which preceded it.

After a welcoming address by Lt. Col. F. C. Butler, deputy commander of the Sacramento Signal Depot, President Mauer opened the meeting. The topic of the evening was presented in a series of talks and demonstrations by speakers from the following activities in the Sacramento area: Sacramento Signal Depot; 6205th Sig CRAU-RES; 972nd Sig Hdg Const. Co.-Res.; Mather Air Force Base; 146th AC & W Sqdn—National Guard; Naval Reserve Area Communications; Coast Guard Reserve; 184th Infantry—National Guard; 636th Field Arty. Bn.—Natl. Guard; McClellan Air Force Base; and 22nd Air Force SC—Reserve.

The October 25th meeting of the chapter consisted of an inspection and demonstration of the California State Highway Patrol operations and communications. Details will appear in the next issue.

St. Louis—Col. C. P. Bobe, Pres.

The St. Louis Chapter opened its fall activities with a dinner-meeeting at the Mark Twain Hotel on September 30th. The program consisted of two interesting sound movies furnished by American Airlines—"Sky Way to Mexico" and "Arizona Sunflight."

Chapter of the Year Contest

As of November 30th the following were in the lead:

Fort Monmouth

Chicago

Sacramento

Pittsburgh

Southern California

Augusta—Camp Gordon

Atlanta

Cleveland

If your chapter's name does not appear in the listing that does not mean it cannot win the contest. A relatively small number of new members for any of the second eight would put that chapter in the running.

Seattle—M. F. Kerr, Pres.

The subject of the October 11th meeting, held at the American Legion Hall, was television. President Kerr opened the meeting with a brief summary of the subject to be covered.

Mr. Marshall James, entertainment chairman, introduced the guest speaker—Mr. Phil Hamlin of the General Electric Supply Company. Mr. Hamlin's talk was preceded by a short film on television, showing relay stations, use of movie film in television, special event broadcasts and television studios in operation. His talk dealt with the following: types of television screens and advantages peculiar to each; grain of picture and size of picture in relation to room size; use of color in television and the relative engineering problem.

The program concluded with a movie entitled "Where Will You Hide?"—the answer being very aptly photographed that there is no hiding place in future wars.

Southern California— H. W. Hitchcock, Pres.

The program of the September meeting of the Southern California Chapter was presented by Mr. T. R. Parkin of the Naval Ordnance Test Station. It consisted of films showing the activities of the Station and discussion of the problems of measuring the ballistics of rockets and other missiles.

Washington—F. H. Engel, Pres.

The officers, directors and committee chairmen of the Washington Chapter met on September 27th at the Raleigh Hotel to adopt a program for the current year. It was agreed to hold four meetings during the year—each of the first three meetings to be sponsored by one of the services, and the fourth meeting to be sponsored by a local communications organization. The proposed constitution and by-laws, drawn up by Lt. Commdr. A. L. Jenkins, general counsel for the chapter, were submitted to national headquarters and approved.

The first of the planned meetings took place November 9th when about 60 of the chapter members toured the Naval Communication Station at Annapolis, Md.

The vast station at Annapolis, under the command of Capt. Richard E. Elliott, USN, is the main communications outlet of the Navy Department, being controlled by a radio control system from the Department in Washington, D. C.

Even the old-timers among the chapter member communicators were impressed by the Navy station's array of over 60 transmitters. Among these was a 500 kilowatt transmitter, one of the world's highest powered in continuous use. The antenna for this transmitter is almost a mile long and is mounted on nine 600 foot towers. The total length of wire comprising the radiating portion of the antenna is about nine miles.

The Washington chapter tour of the station was preceded by a luncheon at the officers' club at the Naval Academy. during which the members were greeted by Capt. Elliott and briefed on the tour by Comdr. Guy M. Neely, USN (ret), chief engineer of the Navy's shore communication system.

(*Comdr. Neely, incidentally, is an especially active member in Washington chapter affairs, and is an associate editor of* SIGNALS.)

STUDENT CHAPTERS

Texas Tech

Capt. W. C. Neubauer, sponsor of the Texas Tech Chapter, reported its 1949-50 activities as follows:

"The chapter is beginning to roll and to date we have had two meetings, a picnic, and we are submitting a float mounted on a 2½ ton cargo truck for the homecoming parade on October 15th."

Officers chosen to lead the chapter this year are: President—Thomas C. Penn; vice-president—L. M. Huffman; secretary—M. G. Harris; treasurer—F. H. Wolf.

University of Alabama

As the magazine went to press, national headquarters received an application for a student chapter charter from the University of Alabama. The chapter was organized through the efforts of Lt. Col. R. A. Dutton, Asst. PMS&T, who reports that there has been considerable interest in the association since the AFCA ROTC award was made at the university last spring. Further details of this newest chapter will appear in the next issue.

IRC HAS THE ANSWER TO YOUR HIGH FREQUENCY REQUIREMENTS...

... Because IRC's *complete* line of resistance products is widest in the industry. And that makes it easy to get the right resistor for your specific high frequency application.

Shown above are 4 IRC resistors specially engineered for VHF and UHF or higher. *MP's* are available in sizes from 2 to 90 watts. For such applications as television side band filters, radar pulse equipment, RF probes and amplifiers and circuits involving steep wave fronts, they provide an unexcelled combination of mechanical stability and uniform electrical characteristics.

MPM's are miniature ¼ watt units suitable for high frequency receivers, I.F. amplifiers and similar circuits.

Deposited Carbon PRECISTORS are outstanding in ability to provide extremely high stability, low voltage coefficient, and low capacitive and inductive impedance at high frequencies.

Advanced BT Insulated Resistors meet JAN-R-11 specifications. At ⅓, ½, 1 and 2 watts, they have excellent characteristics for television frequencies. Type BT's are particularly suited to high ambient temperatures.

Full technical data on these IRC resistors is contained in file-size illustrated bulletins. Use the convenient coupon to send for yours.

For high frequency resistors at high speed, call your local IRC Distributor. IRC's unique Industrial Service Plan enables him to give excellent service on standard resistors in experimental or maintenance quantities. We'll gladly send you his name and address. International Resistance Co., 401 N. Broad St., Philadelphia 8, Pa. *In Canada:* International Resistance Co., Ltd., Toronto, Licensee.

Wherever the Circuit Says —WW—

Power Resistors • Voltmeter Multipliers
Insulated Composition Resistors
Low Wattage Wire Wounds • Controls
Rheostats • Voltage Dividers
Precisions • Deposited Carbon Precistors
HF and High Voltage Resistors
Insulated Chokes

IRC

INTERNATIONAL RESISTANCE COMPANY

INTERNATIONAL RESISTANCE CO.
413 N. BROAD ST., PHILADELPHIA 8, PA.

I would like additional information on the items checked below.

☐ MP Resistors ☐ Deposited Carbon Precistors
☐ MPM Resistors ☐ Type BT Insulated Resistors
☐ Name of Local IRC Distributor

*Name*_____

*Title*_____

*Company*_____

*Address*_____ J. F. ARNDT & CO., ADV. AGENCY

NEWS—SERVICES and INDUSTRY

Russell J. Hopley and Dr. Frank B. Jewett Dead

GENERAL

81st Congress

For some forty years the American people and, therefore, their Congress, have largely ignored the needs of military preparedness save during World Wars I and II. The pleas and warnings of those responsible for our readiness for war brought little action with costly results—as General Marshall testified recently when he urged the passage of the Military Aid Program.

The Congress has now demonstrated an entirely new outlook on the position of the United States in the world today and the need for adequate military preparedness to meet the very real threat to our peace and that of the world which exists and has existed since the close of World War II.

A real start was made by the 80th Congress to correct the grievous errors made in the pell-mell demobilization that followed V-J day. The National Security Act of 1947, as unsatisfactory as it was in many ways, was a most important first step. But the session just ended showed a broad and understanding recognition of the need for strengthening our preparedness.

July 29th was perhaps the high point of the session. It was then that Secretary of Defense Johnson stated emphatically that we could not now try disarmament, pointing out that we had tried that with disastrous results after World War I and that now "there are forces loose in the world that I would not trust for a moment so far as America's disarming is concerned."

But more convincing was General Bradley's revelations of plans to defend the area of the North Atlantic Pact. His statements answered many questions and demonstrated the depth and extent of the Joint Chiefs' vision and planning and the place the Air Force's long-range bombers, the Navy's power and the Army's ground forces might be expected to play in the joint defense, with the European nations, of the pact area. It all gave a clear and comprehensive picture to the American public of how our forces would cooperate with each other and with the manpower of Western Europe in providing the "hard core" of ground defense and with the navies of Europe in the protection of our sea lanes.

The Congress in providing funds for the Military Aid Program demonstrated again its greatness. By no means of minor importance was the adoption by the Congress of a completely new service pay plan, calculated to encourage the best of those now in the service not to abandon their careers as so many have found it necessary to do since the close of the war.

More important, the new pay rates—the first general readjustment in 41 years, since 1908—will attract a reasonable proportion of the most brilliant young Americans to attend the service academies and otherwise enter the services with the intention of remaining. Such men we must have to plan for the next emergency and to lead our forces, if there must be one. This action by Congress comes close in some ways to being its most important.

All the services are proud of the selection of Omar Bradley as the first chairman of the Joint Chiefs of Staff. This modest, professional soldier, trained for selfless service to country since he entered West Point when he was 18 years old, typifies the military leader that the fine traditions of all our services and the service schools produce. He has demonstrated those essential qualities of courage, battlefield and combat leadership, administrative efficiency, understanding of human relations and broad understanding of military problems which come from a lifetime of devotion to the military service.

The Army applauds the selection of General J. Lawton Collins to succeed General Bradley as Chief of Staff. Trained in the same high tradition as Bradley, he was among the most brilliant battlefield commanders in both the Pacific and European theaters and since the war has proved to be an inspiring public speaker for military preparedness—speaking at all the Industry-Army Day annual meetings and the first annual meeting of our own association in 1947.

Still another splendid choice for a new high-level post, as chairman of the "Management Committee," was that of General Joseph T. McNarney, veteran Air Force pilot and World War II deputy Chief of Staff to General Marshall and later commander of our forces in the Mediterranean and in Europe.

Sarnoff Gets Cooper Award

AFCA's past president, Brig. Gen. David Sarnoff, chairman of the board, Radio Corporation of America, was awarded the Peter Cooper medal for the advancement of science November 2d at convocation ceremonies honoring Cooper Union's 90th anniversary.

General Sarnoff was selected by a jury of nine presidents and deans of engineerings schools and colleges in the New York area. The selection was made on the basis of criteria set in 1859 by Peter Cooper in dedicating his institution "to the advancement of science and art in their application to the varied and useful purposes of life."

Prominent AFCA Members Die Less Than Week Apart

Jewett

Dr. Frank B. Jewett, a director of AFCA since the association's inception, died November 18th after an emergency abdominal operation in a Summit, N. J. hospital.

A former vice president of the American Telephone & Telegraph Company, and president of the Bell Laboratories from 1925 to 1940, Dr. Jewett was recognized as one of the world's most distinguished leaders in scientific and industrial research.

His contributions to the nation's military efforts were outstanding in both World Wars I & II. In the former he served in the Signal Corps as a lieutenant colonel. He was also an advisory member of the Navy's special submarine board and a member of the State Department's special committee on cables. For his World War I services he was awarded the Distinguished Service Medal.

In World War II Dr. Jewett was a major contributor to the activities of the National Research Council and the National Defense Research Committee of the Office of Scientific Research and Development, the top civilian agency which coordinated the efforts of thousands of civilian scientists. In recognition of his work the government awarded him the Medal of Merit, the nation's highest award for civilian services in wartime.

Holder of numerous medals and awards, Dr. Jewett had been the recipient of the Edison Medal, the Faraday Medal, the Franklin Medal, and the highest American engineering honor—the John Fritz Gold Medal. He was recently awarded the Hoover Medal, which was to have been presented at a forthcoming meeting of the Institute of Electrical Engineers.

Hopley

Russell J. Hopley, president of the Northwestern Bell Telephone Company, who as head of the Office of Civil Defense Planning last year, directed the preparation of the universally praised report,* "Civil Defense for National Security," died Nov. 23rd of a heart attack in an Omaha, Nebraska, hospital.

For his work in heading civil defense planning, Mr. Hopley was awarded the military establishment's first Certificate of Appreciation following the effectiveness of unification of the armed services. His award was granted for his "exceptionally meritorious service."

* (*The communications - electronics section of the Hopley report was published in* SIGNALS *for Nov.-Dec. 1948.*)

M.I.T. Military Conference

Mutual confidence in the results of fundamental research supported by military organizations in educational institutions was the keynote of a national miiltary conference in the research laboratory of electronics at the Massachusetts Institute of Technology November 14-15.

The meeting, organized to discuss the implications of the electronics research program under way at M.I.T., was attended by more than 50 officials of scientific research within the military establishment.

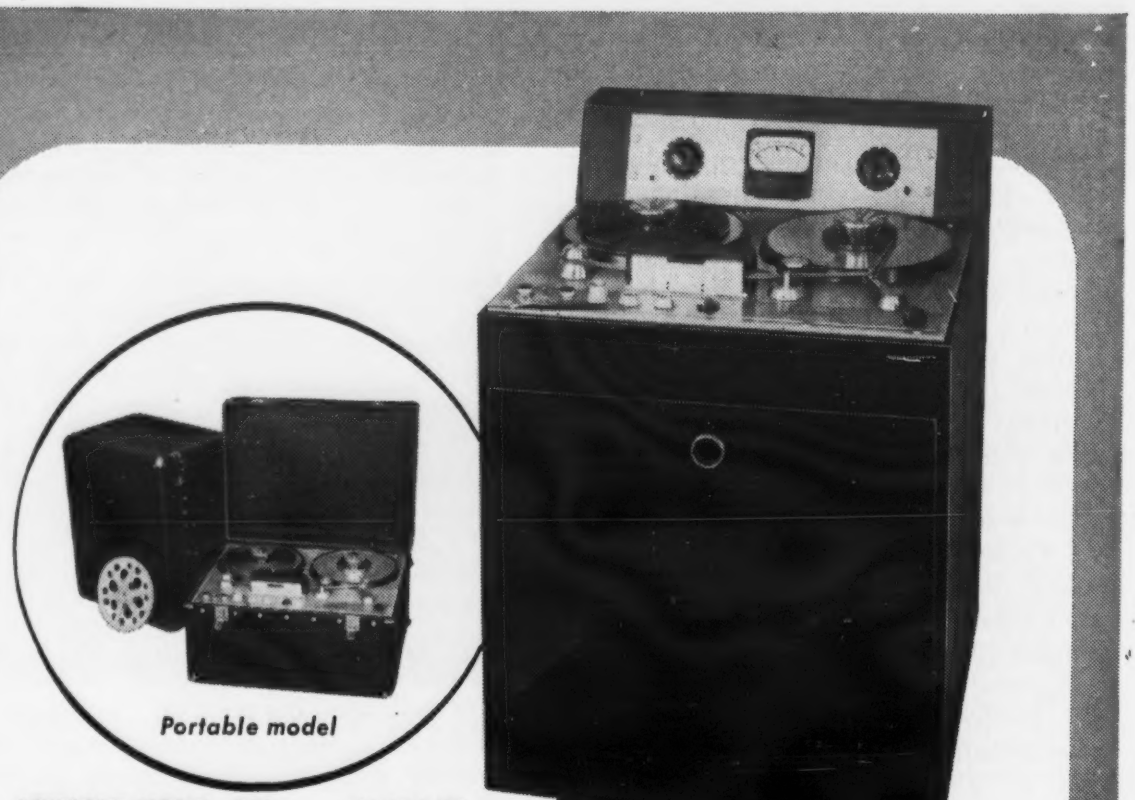
Among military leaders attending the conference were: Maj. Gen. H. M. McClelland, director of communications-electronics for the joint chiefs of staff: Maj. Gen. S. B. Akin, Chief Signal Officer, Army; Rear Adm. John R. Redman, Chief of Naval Communications; Maj. Gen. F. L. Ankenbrandt, director of Air Force Communications; Rear Adm. C. M. Bolster, director of the Navy Bureau of Aeronautics; Maj. Gen. L. C. Craigies, commandment of the USAF Institute of Technology; Dr. T. J. Killian, scientific director of the Office of Naval Research; Maj. Gen. F. H. Lanahan, Jr., commanding general of the Signal Corps Center and Fort Monmouth; Brig. Gen. H. Reichelderfer, commandant of the Signal Corps Engineering Laboratories; and Dr. H. A. Zahl, director of research, Signal Corps Engineering Laboratories.

Opening the conference. Dr. J. A. Stratton, M.I.T. provost, called military sponsorship of basic research in the interest of the entire nation and its industry "one of the most constructive steps taken by the military agencies of any country in time of peace." "The full value of this undertaking," he said, "will be recognized only in future years."

Describing in general terms the activities in the research laboratory of electronics, Dr. Albert G. Hill, director of the laboratory, pointed out that its program was selected primarily on the basis of the interests of the research people who would work in the laboratory. "Our group," he said, "really choses its own program." The very freedom allowed the laboratory in selecting it projects under the military contracts, Dr. Hill pointed out, creates a serious responsibility which "helps us do the right kind of job."

Philco "TechRep" Show

For several years the Philco Corporation has been engaged in a program of training technical representatives to aid the armed services in installing, operating, and maintaining electronics equipment, and to aid the services in training personnel in the same techniques. To demonstrate its accomplishments in this program Philco staged a three-day display, November 8-10, at Washington's Carlton Hotel, and invited service officials in for a look.



CONSOLE MODEL 300* . . . $1,573.75
PORTABLE MODEL 300 . . . $1,594.41
RACK MOUNTED $1,491.75
*Meter Panel Extra F. O. B. Factory, San Carlos, Calif.

Invaluable high fidelity recordings of ★ MESSAGES ★ DELAYED BROADCASTS ★ TRAINING PROGRAMS

on the new series 300

AMPEX

MAGNETIC TAPE RECORDER

Because it is portable, you may take the new Ampex Model 300 anywhere—record any sound. Original quality is preserved. Shock mounted in a steel frame within the rugged cabinet, you can depend on Ampex for many years of dependable service.

SPECIFICATIONS

Frequency Response:
At 15"± 2 db. 50-15,000 cycles
At 7.5"± 2 db. 50-7,500 cycles

Signal-To-Noise Ratio: The overall unweighted system noise is 70 db. below tape saturation, and over 60 db. below 3% total harmonic distortion at 400 cycles.

Starting Time: Instantaneous. (When starting in the Normal Play mode of operation, the tape is up to full speed in less than .1 second.)

Flutter and WOW: At 15 inches per second, well under 0.1% r.m.s., measuring all flutter components from 0 to 300 cycles, using a tone of 3000 cycles. At 7.5 inches, under 0.2%.

Manufactured by Ampex Electric Corporation, San Carlos, Calif.

DISTRIBUTED BY

GRAYBAR ELECTRIC CO. Inc. ★ BING CROSBY ENTERPRISES
420 Lexington Ave., New York 17, N. Y. WAtkins 4-3000
9028 Sunset Blvd., Hollywood 46, Calif. CRestview 1-1171
(offices in principal cities)

AUDIO & VIDEO PRODUCTS CORPORATION
1650 Broadway, New York, New York • Plaza 7-0780

NEWS

Virtually every top communications-electronic officer of the armed services attended the Philco showing, including senior Air Force communications officers who were in Washington for a meeting of their own. The officials expressed considerable interest in the display.

Philco representatives at the Carlton stressed the efficiency of training in the TechRep program, in that repetition of fundamentals is minimized or eliminated in successive courses. Therefore, as a corollary of this simplification, the Philco technical publications are in size but a fraction of many service publications, as was demonstrated with samples on hand.

Because of this streamlining of training, Philco emphasizes, its technical representatives are able to train beginners in a comparatively short time. Which is especially important, it was pointed out, in training civilian component personnel who in peacetime are available for training for only brief periods annually.

The Philco display at the Carlton was under the direction of vice president Robert F. Kerr, in charge of the industrial division, and John Booth, general manager of the TechRep division.

"Ham" Trophy

A bronze trophy, symbolizing the international good will developed by radio amateurs, was presented to George Bailey, president of the International Amateur Radio Union, at Lake Success recently, by Dr. Jose Arce, Argentine delegate to the United Nations.

At the ceremony Mr. Bailey, who is vice president of AFCA's New York chapter, turned the trophy over to the custody of Ben Cohen, Assistant Secretary-General of the U.N., for safe keeping for ten years. In 1959 the trophy will be given permanently to the country that will have done the most for the development of radio during the decade.

New Power for "Voice"

The State Department has put a high-power broadcast transmitter into operation in Munich, Germany, to carry the "Voice of America" programs deeper into eastern Europe and Russia.

Developed by RCA's international division for high power, medium frequency broadcasting, the new 150-kilowatt transmitter was installed to augment existing facilities of the State Department in the Munich area which consist of four 100-KW short-wave transmitters.

Also included in the Munich installation, but operated independently of the "Voice of America," are a 100-KW German broadcast station and a 100-KW armed forces network station.

Operating on 1195 kc, the new transmitter uses a speech-clipper amplifier to maintain a high average percentage of modulation. Excellent performance is reported under these conditions. It has been operated successfully under test with full modulation with carrier power up to 170 KW. Normally 150 kilowatts are delivered to the special antenna system which consists of a 4-element array of half-wave towers.

The antenna has three beam patterns, with bearings of 60° and 240° and a double lobe of 115° and 355°. These can be selected by switching for transmission in three different directions. The forward power gain on the main lobes is in excess of six. This is the first successful attempt to get so great an antenna gain for use with a transmitter of this size. The field intensity at night, as measured by BBC during the period when the beam was directed on England, averaged 1500 microvolts.

Need for Leaders Stressed

Speaking before an audience of American business leaders on September 28 at a New York luncheon of the National Security Industrial Association, formerly the Navy Industry Association, Gen. Omar Bradley urged business and industrial leaders to make some sacrifices and enter government service during these critical times and the trying years ahead. He believes, he said, that many more capable patriotic citizens could and should accept government positions for two years or more and contribute to the better operation of America.

Gen. Bradley's plea was almost identical with that made at AFCA's annual banquet in Washington last March by retiring President David Sarnoff, who said at that time, "I cannot emphasize too strongly that all the large corporations and small businesses, together with their best men, must make company and personal sacrifices to come to the aid of the preparedness planners."

Timberlake Heads MB Staff

Major General Patrick W. Timberlake, AF, has been named director of staff of the Munitions Board, succeeding Lt. Gen. LeRoy Lutes who was recently appointed commanding general

---

THE McCLELLAND SELECTION

The Secretary of Defense added one more to the excellent list of selections to key positions in the newly-created Department of Defense when he selected Maj. Gen. Harold M. McClelland, veteran Air Force communicator as the first director of communications—electronics.

A 1916 graduate of Kansas State Agricultural College, Gen. McClelland was commissioned in the Regular Army in 1917 and soon after earned his wings as a pilot in the aviation section of the Signal Corps. His specialization in communications began with his attendance as a student at the Air Service communications school at Fort Sill, Oklahoma, in 1921. Shortly thereafter—in 1922—he became officer in charge of the Signal Corps radio laboratory at Camp Alfred Vail, N. J., now Fort Monmouth.

General McClelland is one of the real pioneers of communications in the Air Force. He was one of the handful of radio-minded pilots who in the early '30's had talked, planned and pleaded for action to create "Airways" and improve communications in the Air Corps. He was selected by Gen. H. H. Arnold to establish the communications for a trail-blazing mass flight of ten Army bombers over 8,000 miles from Washington to Alaska. He was chosen because of his communications efforts in the Army's success in flying the air mail.

It was immediately after the 1934 flight that steps were taken to establish a permanent airways-communications system for the Air Corps, which service had 50,000 officers in it in 1945, and McClelland was chosen to direct it. During the war Gen. McClelland served as director of air communications for the Army Air Force and later became commanding general of the Airways and Air Communication Service. He has many United States and foreign decorations, including the Distinguished Service Medal. The latter award stated that "as Air Communications Officer, Hq Army Air Forces, from July 1942 to August 1945, (Gen. McClelland) supervised the Army Airways Communications System which furnished communications and navigational aids along the military air routes throughout the world. He pioneered in military electronics, analyzed the enemy's scientific research in this field and instituted radio and radar countermeasures."

The aim of the new communications-electronics directorship is to achieve the fullest coordination among the three services. It does for communications what the new chairman of the Joint Chiefs of Staff, Gen. Omar Bradley, will do for over-all military strategy and planning. Gen. McClelland will establish and control general policies, standards and programs for the joint communications-electronics activities of the armed services. He will study the integration and coordination of the point-to-point wire radio and telephone facilities of the services, be responsible for general supervision over administration and use of personnel and facilities of these activities of the armed services, act as chairman of the joint communications-electronics committee (JCEC), and coordinate with the director, Armed Forces Security Agency, all matters pertaining to security of communications of the services.

On the JCEC with him will be Maj. Gen. S. B. Akin, Chief Signal Officer of the Army; Maj. Gen. Francis L. Ankenbrandt, Director of Air Force Communications; and Rear Adm. John R. Redman, the new Chief of Naval Communications.

General McClelland will hold the directorship for probably two years under the plan, and the post will be rotated among the three services. The director is assisted by two officers from each service. Those initially assigned are: Signal Corps—Col. Victor A. Conrad and Lt. Col. Lawrence P. Jacobs; Navy—Capt. Edwin A. Taylor and Capt. John W. Murphy; Air Force—Col. John B. Bestic and Lt. Col. William H. Lyle.

of the Fourth Army with headquarters at San Antonio, Texas.

Gen. Timberlake had been deputy director of staff and director for military programs of the Munitions Board since March of this year. He has been with the board and its predecessor, the Army-Navy Munitions Board, continuously since 1946.

New Head of Standards

Captain H. L. Bernstein, former deputy chief of the Navy Bureau of Ships' Electronics Division, has been appointed director of the Armed Services Electro-Standards Agency. This agency works out uniform standards and specifications for components and parts of electronic-radio-communications equipments.

Captain Bernstein succeeds Col. L. J. Tatom, former president of AFCA's Fort Monmouth chapter, who has been transferred to Japan.

Electronics and Photography

Emphasis of the parallel interests of electronics and photography, which has been noted in our association since it was founded, is given by the Society of Motion Picture Engineers—an honorary group member of AFCA—which now proposes to change its name to "Society of Motion Picture and Television Engineers."

Rear Admiral John R. Redman, USN, Chief of Naval Communications.

NAVY

Adm. Redman, New Chief of Naval Communications

Rear Admiral John R. Redman, who succeeded Rear Admiral Earl E. Stone as Chief of Naval Communications, August 30, 1949, has an outstanding record during World War II in the Pacific fighting. He served for three years, from October 1942 to April 1945, as communication officer on the staff of Fleet Admiral Chester Nimitz, commander in chief of the Pacific Fleet.

From May 2, 1945, to January 1946 Admiral Redman commanded the battleship USS *Massachusetts*, which was in the thick of the Pacific sea fighting, bombarding and striking at Pacific islands in the outer defenses of Japan.

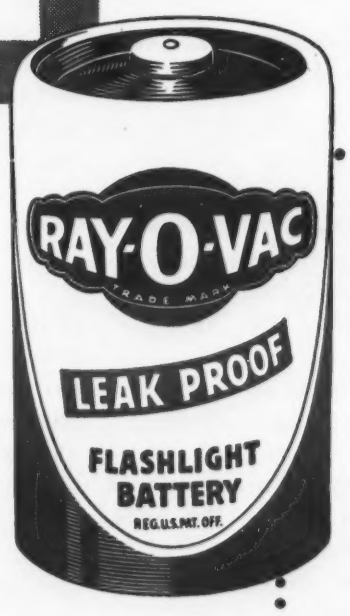
The new Chief of Naval Communications was born at Reno, Nevada, was commissioned ensign in June 1918, graduating with the class of 1919 from the Naval Academy where he had been a member of the varsity football and lacrosse teams and captain of the wrestling team. He served during World War I on the USS *Texas* with the Grand Fleet in European waters. After the war in 1920 he was selected for the United States wrestling squad in the Antwerp Olympic games and won fourth place as a light heavyweight.

After sea duty until 1923 he started on his career as a Navy communicator upon graduation from the Naval Academy postgraduate school in radio engineering in 1924 and for the next two years was radio and communication officer of the Asiatic Fleet destroyer squadron.

In 1927-29 he was assistant district communication officer of the 12th Naval

Remember this combat veteran?

Here it is... in "CIVVIES"



Still on duty... still sealed in steel... still the best batteries money can buy!

With a combat-tested background, this "military veteran" is setting the peacetime pace in its new dress. Ray-O-Vac LEAK PROOF Batteries, in their famous steel jackets and nine layers of insulation, challenge any weather condition, any usage. They stay *fresh* ... perform with the same efficiency that has won for them praise in every theater.

Count on Ray-O-Vac LEAK PROOFS to do the job. And remember, wherever the job calls for a dry battery—light, power, ignition—depend on a Ray-O-Vac product. Our laboratories are geared to solve your battery problems. The Ray-O-Vac Company, Madison 10, Wis.

This Guarantee is printed on every battery: If your flashlight is damaged by corrosion, leakage, or swelling of this battery, send it to us with the batteries and we will give you FREE a new, comparable flashlight with batteries.

Specify RAY-O-VAC leak proofs, and buy spares . . . *they stay fresh!*

District with the additional duties of inspector instructor in Naval reserve communications training. For two years, 1932-34, he had his first assignment in the Office of Naval Communications and then served at sea successively as communication and radio officer of the battle force destroyers, the fleet scouting force, and from 1936-38 as communication officer on the staff of the commander in chief of the U. S. Fleet.

Prior to the war Admiral Redman had served, beginning December 1938, in the interdepartmental communication liaison division of the Office of the Chief of Naval Operations. He was in that capacity at the time of Pearl Harbor and until October 1942.

In addition to the Legion of Merit and two Gold Stars, he has the Victory Medal, American Defense Medal, American Area Campaign Medal, and the World War II Victory Medal.

Sonne Evaluation Program

The Navy is cooperating with the Air Force in a program for evaluation of Sonne, an electronic system of long range navigation.

The Navy's participation will consist of monitoring Sonne transmissions at Navy communication centers at Argentia, Newfoundland; Grondal, Greenland; Balboa, Canal Zone; and San Juan, Puerto Rico. The object is to obtain overwater transmission data.

Sequence of Sonne transmissions consists of a series of morse code characters, a fifteen-second silent period, a sixty-second keying cycle, a five-second silent period, and a second sixty-second keying cycle.

Monitoring will involve an aural count of Sonne signals during the keying cycles, as well as relative measurements of signal strength and noise levels.

Logs will be submitted to the Air Force's Watson Laboratories, headquarters for the project, for coordination and evaluation together with data from other monitors.

Patterson to Head Communications Fiscal-Personnel Section

Returning to Washington after a tour of duty as commanding officer of the USS *Catamount*, a landing ship (dock), Captain A. M. Patterson, USN, has been assigned as head of the fiscal and personnel section, administration branch, Office of the Chief of Naval Communications.

A communicator of long standing, Captain Patterson is a graduate of the applied communications course, U. S. Naval post-graduate school Annapolis. He previously had served in the Office of the Chief of Naval Communications as head of the registered publications section. Capt. Patterson relieves Comdr. A. F. Richardson, USN, who has been ordered to duty at the U. S. Naval Academy.

AIR FORCE

MATS Report

The Military Air Transport Service of the U. S. Air Force has made public the report of its first year of operations to Secretary of Defense Louis Johnson through the chief of staff, U. S. Air Force.

MATS was the first large scale unification project in the armed services.

The report said that MATS had recommended description of the consolidation of the Air Transport Service and Naval Air Transport Service as "integration" rather than "unification." Naval personnel now total about 3,000, which is approximately six per cent of total MATS military manpower.

Traffic on Airways and Air Communications Service facilities operated by MATS increased during the past year although the number of facilities decreased. Tower-to-plane contacts increased from 14 million to 19 million. Ground control approach let-downs numbered 244,000 compared with 172,000 for the previous year. Integration of those Navy, Marine Corps, Coast Guard, National Guard and Reserve installations, which were planned to be part of the military flight service communications system, was completed. AACS provided communications support for major movements of USAF units outside the United States. During the year AACS trained foreign nationals of Brazil, Canada, France, Portugal, Saudi Arabia and the United Kingdom in the operation and maintenance of Air Force communications equipment.

AF Electronics Schooling

To meet a vital need for officers trained in electronics and electrical engineering to fill assignments in the Air Force guided missiles, radar, and communications programs, the USAF Institute of Technology, Wright-Patterson Air Force Base, Ohio, has extended its educational plan in the field of electronics both at the institute and in civilian colleges.

The extended plan now offers educational opportunities and career openings in the fields of electronics and electrical engineering to 189 Air Force officers each year. It includes a 2½-year undergraduate course in selected civilian universities, open to 50 officers annually, an electronics elective within the regular two-year engineering sciences course of the Institute of Technology to provide 50 more officers, and for the balance of the requirement the encouragement of graduate study in electronics in civilian schools by those officers qualified to undertake such work.

The Institute of Technology invites applicants to consult Air Force letters 50-71 covering undergraduate applications, 50-21 for graduate study, and 50-24 for the regular two-year resident courses of the institute. It is further pointed out that the 2½-year undergraduate electronics course in civilian colleges is planned basically for officers with limited prerequisites. Applicants for this course will be considered with only a high school education if they have at least two units of high school mathematics.

All completed applications should be forwarded through channels to the commandant, USAF Institute of Technology, Wright-Patterson AF Base, Dayton, Ohio, to the attention of the academic administration section. The institute emphasizes, however, that any interested officer may write at any time for evaluation of his educational background to determine eligibility for USAFIT. All such requests are carefully evaluated, and where deficiencies are found, recommendations are made for the officer's individual use in his own education plan.

Airborne Radio Conference

Frederick R. Lack, vice president of the Western Electric Company, and president of AFCA, was the principal speaker at the recent first technical conference on airborne electronics at Dayton, Ohio.

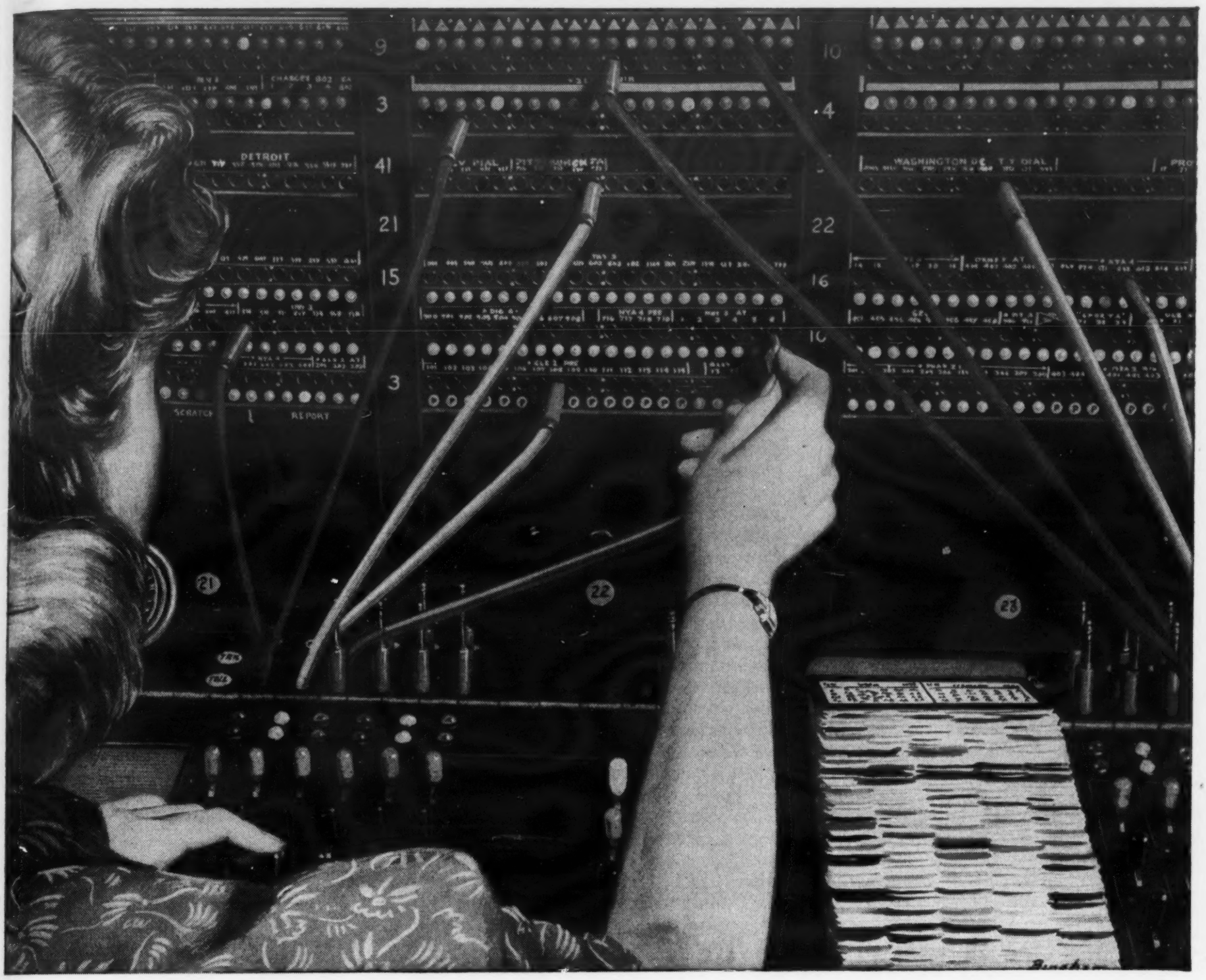
The conference sponsored by the Dayton section of the Institute of Radio Engineers, honorary group member of AFCA, was held in response to the demand for exchange of information on this vital subject.

In his talk, Mr. Lack traced the development of airborne electronics since World War I and urged as his two main points, "reliability" and "maintenance."

Mr. Lack pointed out that modern household radios and refrigerators, for example, have reliability and little or no maintenance. Even the complicated systems of long-distance telephones function with a high degree of reliability and a minimum of maintenance. He suggested that air navigation aids, radar, and various aviation electronic equipment should be built the same way.

Following Mr. Lack's address six significant technical papers were presented. John F. Byrne, Airborne Instruments Laboratory, 160 Old Country Road, Mineola, presented an analysis of the faired-in antenna development program for high speed aircraft. Omnidirectional range reception was discussed in some detail and the results obtained with B-45 and F-90 aircraft were presented.

Much work on this subject has been in progress at Wright Field where, since 1943, three groups in the communications and navigation laboratories have spent full time building antennas into the skin of all aircraft. It has been found that the F-80 jet fighter, for example, with only five outside antennas, loses 38.6 engine hp at 400 mph. At 500 mph, antenna drag cuts 176 hp from the ship and at 600 mph, the loss rises up to 418 hp.



What's the connection?

TO give you good service, your Bell Telephone company must have good switchboards, cables, telephones, and literally thousands of different types of equipment. Each must be *designed*, then *manufactured*, so that all can *operate* together perfectly in carrying your voice quickly and clearly across the street or across the nation.

Do you know Western Electric's connection with all this? For sixty-seven years, we have been the manufacturing unit of the Bell System. This has assured a dependable source of good equipment—efficiently and economically produced to meet the needs of telephone users.

• **As members of the Bell System, Western Electric people who *make* equipment, Bell research people who *design* it and Bell Telephone company people who *operate* it all work together with one aim: Good telephone service for you at the lowest possible cost.**

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

NEWS

In discussing air navigation and traffic control, Dr. Douglas H. Ewing of the air navigation development board pointed out that the increasing demands on the nations' air navigation and traffic flow facilities brought about by the war and the subsequent rise in air traffic have shown our existing facilities to be obsolescent. The problem of designing a new system has been studied by many groups, particularly the radio technical commission for aeronautics and the research and development board. As a result of the study conducted by these two groups, the air navigation development board has been established by the Secretaries of Defense and Commerce. It is charged with the responsibility of developing an air navigation and traffic control system which will serve the needs of non-tactical military aviation as well as those of all civil users of airspace.

The discussion included a summary of the board's research and development program and an evaluation of recent engineering effort in the field.

Dr. Henry G. Booker, Cornell University, discussed aspects of radio wave propagation. He stated that during the war it was found that radio refraction in the lower atmosphere often made it possible for radar receivers to see round the curved surface of the earth and to plot targets far below the geometrical horizon.

The phenomenon of super-refraction was associated with the occurrence, of a radio duct, or wave guide, close to the surface of the earth. Any two points within such a duct are intervisible by refraction even though each is below the other's geometrical horizon. Field strength at one due to a transmitter at the other can therefore be of the same order of magnitude as would occur in complete free space, provided that the wavelength is sufficiently short and atmospheric attenuation is unimportant. With the increase of wavelength, however, the duct (being qualitatively similar to a wave guide in the form of a metallic pipe) ceases to be able to guide the waves efficiently; for sufficiently long wavelengths propagation takes place substantially as though no duct existed.

Dekametre and longer wavelengths are largely free from super-refraction because ducts extending from the earth's surface up to a height of the order of 100 feet are sufficient to guide them quite efficiently and are of frequent occurrence. In its most intense form, ducts extending from the surface up to heights of a few thousand feet, efficient guiding is possible, not merely for centimeter wavelengths, but also for decimetre and metre wavelengths. In its weak form, super-refraction merely causes a decrease in attenuation beyond the horizon, particularly at centimetre wavelengths.

For communication at metre wavelengths, and particularly for air-to-air communication, elevated ducts associated with subsidence-inversions are likely to be quite important and should be made the subject of special investigation.

Dr. Booker also pointed out that in recent years the scattering properties of the atmosphere, as distinct from its refractive properties, have come to attention. It appears that field-strength appreciably beyond the horizon is often due not to diffraction round the curved surface of the earth nor to refraction in the atmosphere but rather to scattering from the "illuminated" region of atmosphere above the horizon down into the "unilluminated" region below the horizon. This scattering arises from the statistical variations of the atmosphere which are also the primary cause of fading and of sound echoes from the atmosphere. Radio echoes from the atmosphere known as "angels" almost certainly have another explanation, however, such as birds and insects.

Current and future trends in the field of aviation communications equipment were discussed by John D. Woodward, Radio Corporation of America. General discussions included such items as: overall communications systems, selectivity problems, frequency generation, automatic antenna tuning, interphones, etc. Recordings were played to demonstrate some of the noise and acoustic problems associated with microphones.

In pointing out design trends in electronic components for airborne equipment, Frederick J. Given of Bell Telephone Laboratories centered attention on "miniaturization." During the war this word had particular significance, he said, for assemblies of components called "printed circuits" for use in ordnance devices. The success of achievements in this direction has acted as a trigger to stimulate widespread effort to obtain greatly reduced size in all electronic equipment including its accessories.

Much of this effort includes the unit packaging of small components which function together as a unit circuit such as an amplifier or oscillator. Unit packaging may involve the idea of printed wiring or it may involve alternative means of compacting components and their connecting wires.

Effort in this direction requires companion action in size and weight reduction of bulkier components even though their use may be less frequent. These include dynamoters, switches, transformers, high voltage capacitors, and variable air capacitors. Additional effort should be directed at the use of new or simplified circuitry such as may come about from the adoption of 400 or 800 cycle power supply frequency or the adoption of radically new circuit elements such as the transistor.

An unusual paper was presented by Dr. Paul M. Fitts of Air Materiel Command on psychological aspects in the operation of airborne electronic systems. Three general areas in which engineering psychology can contribute to the design and operation of airborne electronic systems are (1) improved detection of signals; (2) improved ability to interpret the significance of information; and (3) improved control and systems characteristics.

The visibility and legibility of visual radar displays are primarily a function of size, brightness, contrast, and pattern characteristics of the returns. Contrast should be maximized, but there is usually an optimum size for any display above and below which performance of a human operator decreases. Other factors are color, level of general illumination in the work-place, and psychological considerations in minimizing the effects of noise.

Adequate comprehension and interpretation of information depends on considerations different from those that determine visibility. Some of these factors, such as the coordinate systems used to represent spatial relationships, were reviewed in the presentation.

The efficient operation of airborne electronics systems depends also on adaptation of the system to utilize the output side of the human operator. Here we are concerned with discrete adjustment of various controls and switches, and also with situations in which the human is asked to function as a continuous, error-minimizing control system.—*Tele-Tech.*

KEY PERSONNEL CHANGES

Stars for Putt and Maude

Donald L. Putt has been appointed Major General and assigned as director, research and development, in the office of the deputy chief of staff for materiel, in Washington. General Putt was first captain of the ROTC - Signal Corps cadet battalion at Carnegie Institute of Technology, graduating and receiving his B.S. in electrical engineering in 1928.

He became a flying cadet in the Air Corps immediately after receiving his degree, and received his pilot rating in June 1929. He has specialized in engineering during most of his career in the Army and Air Force. He holds the Legion of Merit, the Bronze Star Medal with Oak Leaf Cluster, and M.S. degree in Aeronautical Engineering from California Institute of Technology, and is a graduate of the Air Corps primary and advanced flying schools and technical and engineering schools.

Raymond C. Maude, 1949 graduate of the National War College, has been appointed brigadier general and assigned as executive to director of requirements, deputy chief of staff for operations in Washington. General Maude was first captain of the U. S. corps of cadets at West Point, graduating in 1926 and being commissioned in the Signal Corps, serving in that branch until he transferred to the Air Corps in 1947. During World War II he served in the European Theater of Operations and in Washington in Air Forces communications. He holds the

Legion of Merit with Oak Leaf Cluster and the Bronze Star Medal, and is a graduate of the Signal School, the Command and General Staff School, and the Army and Navy Staff College.

Other Changes

Col. John B. Bestic: Reassigned from the director of communications, deputy chief of staff, Hq, USAF, to the director of communications-electronics, joint chiefs of staff.

Col. Wilfred H. Tetley: Reassigned from Watson Laboratories, Red Bank, N. J., to the Munitions Board, Washington, D. C., serving as communications member on the board.

Col. Ross T. Sampson: Reassigned from the U. S. Air Mission to Turkey to the 2d Air Division, USAF in Europe.

The following officers have been promoted from lt. colonel to permanent colonel with rank from 19 October 1949.

Joe A. Bennett
Llewellyn G. Duggar
Christian D. Kauffman
William H. Lyle
Frank J. Shannon, Sr.

To Industrial College of the Armed Forces:

Col. Richard I. Dugan

To Armed Forces Staff College at Norfolk:

Col. Charles Thorp

ARMY SIGNAL CORPS

Signal Corps Expending 130 Million for 1950 Fiscal Year

Under the appropriations for the 1950 fiscal year, which were approved by Congress in its closing days, the Army Signal Corps now has available approximately $130 million for the procurement of electronic and communications equipment and supplies and on research and development work. This is out of the total of $197,062,137 appropriated by Congress for the operations and functioning of the Signal Corps for the current fiscal year of 1950 which ends next June 30.

The more than $130 million cash amount available for procurement and research and development includes several elements. About one-third, or somewhat over $55 million, was allocated for procurement of equipment and supplies and research and development projects of the Signal Corps itself. In addition, the Signal Corps was authorized to contract for approximately $60 million worth of equipment and supplies which are "common electronic equipment" items needed by the armed services, particularly the Air Force. It is estimated that the Military Assistance Program, which is designed to assist and strengthen the miiltary forces of the nations of the North Atlantic Pact, will require about $15 or $20 million for procurement of communications-electronics equipment through the Signal Corps.

There is also in the 1950 fiscal appropriations of the Signal Corps an allocation of $50 million to cover contract procurement authorizations completed during the 1949 fiscal year (July 1, 1949—June 30, 1949). The Military Assistance Program has been tentatively allocated about $40 million for communications and electronics equipment, but the indications are that the entire amount may NOT be expended during the 1950 fiscal year.

There is understood to be increasing interest in Signal Corps procurement activities from manufacturing companies which have never had Signal Corps contractual relationships. During the past nine months it is estimated about 2000 such inquiries have been received. But it may be noted that during the 1949 fiscal year the actual results were that one out of every four firms receiving invitations from the Signal Corps submitted a bid.

MARS as Back-up System

The effective worth of the Military Amateur Radio System as a back-up for established military communications networks was ably demonstrated recently when a two-way contact was established between Washington, D. C., and Honolulu, T. H.

TEAMWORK
TO the military structure of this nation, electronics adds keener eyes, sharper ears, longer arms, faster reflexes. Each of these priceless advantages is the result of unrelenting, combined effort by talented men in industry and in uniform.
Close teamwork with the armed forces is a tradition and a matter of pride with the General Electric Company. At Electronics Park, this fruitful relationship extends to new horizons as problems get tougher and product demands more exacting. Sparked by imagination and resourcefulness, G.E. and the services jointly harness, for the national interest, the most advanced techniques in all phases of electronics.
In the laboratories and on the factory floor, the search for knowledge and the reduction of new ideas to tangible products is ever widening. Behind it all is the conviction that on a shrinking globe, science is the great ally of security.
General Electric Company
Electronics Park, Syracuse, New York
GENERAL ELECTRIC

The demonstration proved to Army observers that the MARS is capable of pinch-hitting for the established armed forces networks should the need arise. Set up as part of a troop I & E program at Fort Shafter, T. H., the hour-long radio contact featured an address from Maj. Gen. Spencer B. Akin, Chief Signal Officer, via WAR, to his more than 200 signal officers in USARPAC.

The "live" broadcast was relayed by Fort Shafter MARS station AB6USA to the field officers via a loud speaker system in the Fort Shafter theater. Response from the Hawaii end of the QSO was made by Colonel Thomas J. Cody, USARPAC signal officer.

An open forum on unclassified signal communications projects between the assembled officers in Honolulu and representatives of the office of the Chief Signal Officer in the Pentagon concluded the demonstration.

Career Fields

It is planned by Department of the Army to publish all career guidance career fields in special regulation 650-200 series.

Signal Corps career fields in order of anticipated publication are: wire communication installation and maintenance; communications; radio and wire Telegraphy; electronics; and photography.

Self-study guides will be published to aid individuals to improve their proficiency in their military occupational specialties and to prepare themselves for the competive examinations for promotion.

KEY PERSONNEL CHANGES

Gen. C. H. Arnold Retires

On October 31, 1949, Brig. Gen. C. H. Arnold, Signal Corps, retired from the Army at his own request after more than thirty years of service.

In the four years immediately preceding his retirement General Arnold served as the Signal Corps' chief of procurement and distribution division. In the past he directed the Army's huge program of contract termination, surplus property disposal, purchase, storage and distribution of communications and photographic equipment.

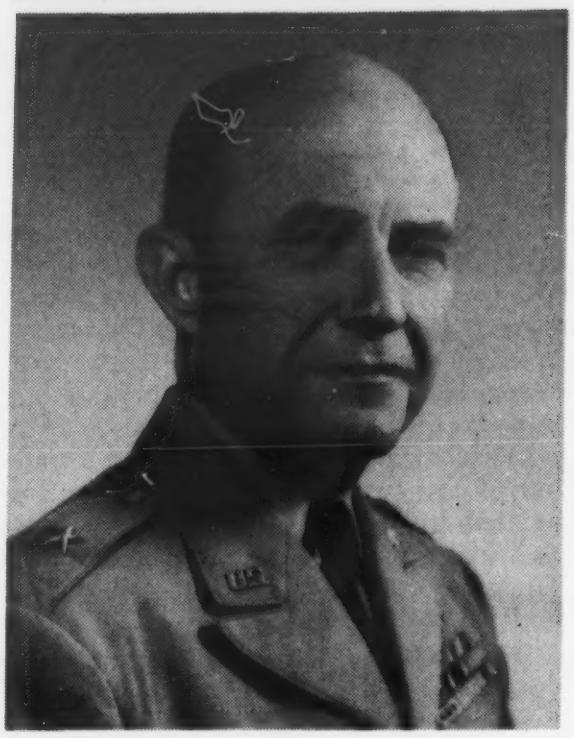
During Gen. Arnold's tenure the contract price of items cancelled for which settlement proposals were submitted to the Signal Corps was approximately 2.5 billion dollars, while the surplus property disposed of was in excess of $690,000,000.

The depot system was reorganized during General Arnold's tour and now includes nine supply installations, including four major depots at Sacramento, California; Decatur, Ilinois; Lexington, Kentucky; and Baltimore, Maryland.

General Arnold's distinguished career in the Army began as second lieutenant of Infantry in August 1917. He served in France and Germany in World War I with the 53rd Infantry Regiment of the 6th Infantry Division, transferring to the Signal Corps in 1920.

In World War II he was among the first to go overseas, leaving by air eight weeks after Pearl Harbor for duty as signal officer of the American forces in Australia. Traveling by the way of the South Atlantic and Africa, he first arrived in Java and there joined General Brett's staff until the American forces were forced to withdraw to Australia. He organized initial communications and supply services for the American forces in that theater. Subsequently, he returned to the U. S., where he served as commandant of the Central Signal Corps School at Camp Crowder, Mo., until his assignment to Washington in 1945.

He received B.S. and A.B. degrees from Mercer University, Georgia, and is a graduate of the Army Signal School, the Industrial College, the Command and General Staff School, and the Army War College. He was awarded the Legion of Merit for his services at Camp Crowder.



Brig. Gen. C. H. Arnold recently retired with last 4 years of service notable for high accomplishments as Signal Corps chief of procurement and distribution.

Col. Tully to England

Colonel Terence J. Tully, deputy president of the Signal Corps Board at Fort Monmouth, New Jersey, has been ordered to London to represent the three armed services when expert advice is required on communications problems arising under the military air program.

Prior to his Fort Monmouth assignment, Colonel Tully was commanding officer of the Alaska Communication System. During World War II he was American chief signal officer of the Mediterranean Theater and commanding general of the Army service forces training center at Camp Crowder, Missouri. Colonel Tully has been officer-in-charge of the Signal Corps tradition program, at Fort Monmouth, where Colonel J. D. O'Connell has assumed this duty.

Col. Maier Joins Pullman

Col. Oscar C. Maier, who recently resigned from the engineering division of the U. S. Air Force at Wright Field, Ohio, has accepted a position with Pullman-Standard Car Mfg. Co. as director of research.

A graduate of the U. S. Military Academy at West Point, Col. Maier also holds masters degrees from Yale University and from the California Institute of Technology where he served as research assistant to Dr. R. A. Millikan. Col. Maier also is chairman of the executive committee for the annual conence on administration of research held at Pennsylvania State College.

To Industrial College of the Armed Forces

Lt. Col. C. S. Cerwin
Col. H. Houston V. Evans
Lt. Col. R. C. Huggins
Lt. Col. H. A. Keller
Lt. Col. George F. Rogers
Lt. Col. E. B. Thornton

To M.I.T.

Col. Cary J. King, Jr., for postgraduate electronics course.

First-Three-Graders

The following Signal Corps first-three-graders have recently transferred, reenlisted, or graduated from the Signal School, Fort Monmouth, N. J.

Transferred to EUCOM

M/Sgt Richard D. Kimball, *17th Signal Co., Washington, D. C.;* Sgt Bobby L. Zimmerman, *Fort Monmouth.*

To FECOM, from Ft Monmouth

M/Sgt Herbert A. Boyd, M/Sgt Guy N. Randall, Sgt 1/cl Francis M. Jeffreys, Sgt 1/cl Robert M. Sutter, Sgt William E. Caughey, Sgt Walter D. Hammond, Sgt Sherman Hummer, Sgt Michael W. McCormick, Sgt Lawrence J. Oakley.

ZI Transfers

M/Sgt William J. Berger, Sgt Joseph C. Franklin, *Pipeline to Fort Monmouth;* M/Sgt John B. Richard, *Ft Monmouth to Hq 5th Army;* Sgt Carlisle Harth, *Ft Monmouth to 17th Sig. Co., Washington, D. C.;* M/Sgt Nathan Hamonds, *Ft Monmouth to Ft*

Kaiser

1917-1949

Kaiser, the famous Signal Corps pigeon, died at 9:30 P.M., 31 October 1949.

32 years old when he died, Kaiser had had eight wives and sired 103 offspring.

Scientists at RCA Laboratories solve exacting problems within the "nothingness" of vacuum tubes.

Inside story *of Better Television*

Now television is flashing *visual* entertainment, news, and educational material to millions of people. The "inside story" of its rapid growth is the history of some remarkable tubes. Inside these tubes, electrons are put to work—to perform, for your benefit, the miracle of long-distance vision.

The screen of your direct-view television receiver is actually the face of a tube—the kinescope developed by Dr. V. K. Zworykin and his colleagues of RCA Laboratories—on which electrons in motion "paint" pictures. A tube, too, is the "eye" of RCA's supersensitive Image Orthicon television camera, which can "see" clearly by the light of a match.

And since you asked for big-picture television, they developed projection receivers—also a way to "weld" glass and metal, thus speeding the production of 16-inch direct-viewing tubes . . . at lower cost.

To these basic "firsts," RCA scientists have added advance after advance, which are daily bringing television into the lives of more and more people.

How you profit

Advanced research in television tubes is just one way in which RCA Laboratories work in your interest. Their leadership in science and engineering adds *value beyond price* to any product or service of RCA and RCA Victor.

Examples of the newest advances in radio, television, and electronics—in action—may be seen at RCA Exhibition Hall, 36 West 49th Street, New York. Admission is free. Radio Corporation of America, Radio City, New York 20.

RADIO CORPORATION of AMERICA

World Leader in Radio—First in Television

Dix; Sgt Joseph Paradiso, *Ft Monmouth to Ft Lewis;* Sgt 1/cl Theodore R. Tyson, *Ft Monmouth to Ft Lawton;* Sgt Erby J. Ewing, Jr., *Ft Monmouth to Camp Hood.*

Reenlisted at Ft Monmouth

M/Sgt Francis L. Perryman, Sgt 1/cl Herman H. Berry, Sgt 1/cl Joseph Rortina, Jr., Sgt 1/cl James J. McFarland, Sgt 1/cl Floyd L. Perry, Jr., M/Sgt Domenico M. Barbieri, M/Sgt Donald P. Christine, M/Sgt Roy C. Gerard, M/Sgt . Maurice Gibson, Sgt 1/cl Stanley Taylor, Sgt 1/cl Justus R. Lilze, Jr., M/Sgt Michael T. Gargan, Sgt Henry Warren, M/Sgt Henry H. Weidner, M/Sgt Philip C. Schloesser.

School Graduates, Ft Monmouth

Sgt 1/cl John B. Edrington, *radar repairman* (*designated equipment*) ; Sgt Richard B. Gorr, *automatic telephone system, maintenance man;* Sgt. Ralph A. Santos, *cameraman, motion picture;* Sgt Elston J. Sanders, *radio repairman;* Sgt Somers B. Collins, *radio operator, intermediate speed;* Sgt Melvin M. Seay, *radar repairman,* (*designated equipment*).

Promotion examinations for Signal Corps first-three-graders assigned to class II installations under control of the Chief Signal Officer were held December 1st, according to the career management branch of the OCSigO. The prior such examinations resulted in 447 promotions.

CIVILIAN COMPONENTS

Special Courses for N G

The Industrial College of the armed forces will conduct special field economic mobilization courses for National Guard officers in several cities throughout the country, beginning this fall. These courses will be open to selected Army and Air National Guard officers with outstanding service records, whose possible future assignments will be at policy-making elevels. An estimated 160 officers are expected to enroll for the instruction.

Similar courses were given last year with 140 National Guard officers enrolled. The classes this year will be limited to those who did not pursue the courses last year.

The courses will be offered in the First Army area at Rochester, N. Y., 15-26 May, and New York City, 5-16 June.

Second Army—Richmond, Va., 5-16 Dec.; Cincinnati, 30 Jan.-10 Feb.; and Philadelphia, 5-16 June.

Third Army—Birmingham, Ala., 6-17 March.

Fourth Army—New Orleans, 6-17 Jan.

Fifth Army—Detroit, 27 Mar.-7 Apr.; Milwaukee, Wisc., 10-21 Apr.; and Omaha, Nebr., 1-12 May.

Sixth Army—Portland, Ore., 5-16 Dec.; and San Francisco, 27 Feb.-10 March.

Physical examinations will be waived for officers selected to take the courses. Applications should be submitted through channels early enough to permit submission of names to the Industrial College of the armed forces two weeks prior to the opening date of each course. Where the waiving of rank requirement is desired, the request should accompany the application.

Reserve Logistical Units

Organization of a limited number of logistical headquarters units designed to meet mobilization needs is being planned by the Department of the Army. Headquarters of this type will coordinate the furnishing of supplies, transportation and other services required in combat areas.

Most of the units are to be formed in the Organized Reserve Corps and will be composed of both Reserve officers and enlisted personnel. Units will be allocated to the six army areas and will undergo active training programs.

The new plans will bring into being for the first time organized headquarters set up for the purpose of coordinating Army service operations. Combat arms have long worked together as a team, with the headquarters of divisions, corps and armies coordinating their activities. The headquarters units now being planned, the Army stated, will control the many unified service activities needed in combat and help to provide more efficient support to the combat soldier.

The new logistical headquarters will be of three sizes, depending upon the personnel strength of the combat forces being supported. The largest size is to be staffed by approximately 200 officers along with enlisted support.

AF Reserves Tour LaGuardia

By S/Sgt Wm. J. Frech

New York's La Guardia Airport, one of the busiest air terminals in the world, became a classroom for a day during a recent visit by officers of the USAF's 3rd Airways and Air Communications Service (AACS) Reserve Wing in conjunction with their regular monthly training period.

The Reserve officers, accompanied by members of the staff of the 1802nd AACS Group Headquarters, regular Air Force unit located at Mitchel Air Force Base, Long Island, with whom they train one week-end a month, had been invited to inspect the facilities of the Civil Aeronautics Authority at La Guardia. Vincent Carson, New York port authority superintendent of the airport, himself a Reserve major assigned to the 3rd Wing, had arranged the tour with Ora Young, regional CAA supervisor.

La Guardia CAA members and the staff of the Port of New York Authority, under whose jurisdiction the airport falls, proved more than cooperative in conducting the visiting reservists on a complete tour of the communications, weather and maintenance facilities at both the overseas and domestic terminals of the world-famed airport.

At the outset of the inspection trip the officers were split into three groups, each group headed by a representative from the staff of the New York Port Authority. From there the conducted tours visited in succession the CAA air traffic control center, weather station, domestic and overseas air-to-ground radio communications center, the control tower (located above La Guardia's busy domestic terminal building), and the offices of the Port of New York Authority.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc., required by the act of Congress of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946, of SIGNALS Magazine, published bi-monthly at Washington, D. C., October 1, 1949.

District of Columbia } ss.
City of Washington }

Before me, a notary public, in and for the State and County aforesaid, personally appeared Wallace R. Fingal, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the SIGNALS Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership and management of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher: Armed Forces Communications Association, 1624 Eye St., N. W., Washington 6, D. C.

Editor: Brig. Gen. S. H. Sherrill (Ret.), same address.

Managing Editor: Wallace R. Fingal, same address.

Business Manager: Wallace R. Fingal, same address.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Armed Forces Communications Association, Washington, D. C.

President: Fred R. Lack, 120 Broadway, New York 5, N. Y.

1st Vice Pres.: Theodore S. Gary, 1033 W. Van Buren St., Chicago, Ill.

2nd Vice Pres.: Thos. J. Hargrave, 343 State Street, Rochester, N. Y.

3rd Vice Pres.: Rear Adm. Earl E. Stone, 3801 Nebraska Avenue, N. W., Washington, D. C.

4th Vice Pres.: J. R. Cunningham, United Air Lines, Stapleton Air Field, Denver 7, Colorado.

5th Vice Pres.: Brig. Gen. C. O. Bickelhaupt, American Tel. & Tel. Co., 195 Broadway, New York 7, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are:

None.

4. That paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also that the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

WALLACE R. FINGAL,
Business Manager.

Sworn to and subscribed before me this 3rd day of November, 1949.

Seal EMILY H. KNOTTS.
Notary Public.
(My commission expires 14 December, 1951)

Letters TO THE EDITOR..

SIR:

Regret that I will be unable to renew for coming year. This is mostly due to high cost of living and the recent setback imposed on members of the Armed Forces by Congress such as PX privileges, commissary privileges and income tax with small increase in pay. A family with one child or more just can't afford $5.00 for renewal. Perhaps in the future I may be able to join again as I have always found SIGNALS a very interesting magazine and I believe your views and interests for which you stand are sound and necessary.

H.E.J.
WOJG

SIR:

I was very much interested in receiving your circular letter dated "August 1949," with reference to the Armed Forces Communications Association. I assume from reading the pamphlet which came with your letter that, as a Canadian company, the Northern Electric Company is not eligible for membership in this Association.

I hope that when the joint defense of the North American Continent passes the "committee" stage and when our two countries agree on some semblance of standardization of equipment and training, that organizations which we have in Canada whose objectives are similar to those of your organization, can be affiliated or amalgamated. Such cooperation would assist materially in organizing the industrial potential of both countries on an efficient and integated basis to supply equipment to the Armed Forces of both countries whose responsibility then would be the defence of the entire continent.

I would appreciate it very much if you would let me know whether or not we could subscribe to your publication SIGNALS as I am quite sure that a number of people in our company would be extremely interested.

R. D. HARKNESS, *President,*
Northern Electric Company,
Montreal, Quebec

SIR:

I wish to acknowledge your letter and to assure you of our efforts to encourage further interest in the Association and in SIGNALS.

We are deeply interested in the purpose of the Association and right now are engaged in a 537 mile extension of our Main Line V.H.F. radio system which was planned by the Erie with a view also to its value in a national emergency such as a next one would surely be.

When completed this year the system will be in use on 884 miles between New York and Marion, Ohio, or about 85 percent of the Erie's New York-Chicago main line trackage.

With radio, our train crews are in constant communication between head end and rear end of trains, with crews of other Erie trains and with our wayside stations. Both freight and passenger trains are equipped and the system is providing added safety and increased dependability in railroad operation.

As a member of the Association you may be sure of my continued efforts in its behalf.

F. H. MENAGH,
Supt. of Communications,
Erie Railroad Company

See next page for other communications.

NEWS

At each stop the civilian supervisors in charge of the respective installations thoroughly explained their operation and made clear the handling of the huge volume of traffic at La Guardia through the intricate system of air traffic control, backed up by experienced communications and weather personnel.

The reservists were impressed with the similarity in operation of the CAA facilities in comparison to those operated by the 1802nd AACS Group, with which they train. As one reservist remarked, "The AACS is the CAA of the Air Force. AACS and CAA handle identical missions . . . air traffic control, air-to-ground communications, and radio and radar navigational facilities."

The mission of AACS closely parallels that of CAA—both functioning primarily as service organizations . . . one serving military, the other civil aviation. The two work hand in hand at many airbases. During the war many AACS personnel, assigned to bases around the world, were former CAA communications specialists. Today, many AACS-trained radio technicians and air traffic controllers are working for CAA.

The tour was pronounced a definite success by all concerned. The exchange of ideas between these organizations having relatively similar functions in military and civil aviation, marks a milestone in the betterment of relations between the two and the increasing of knowledge for the over-all good of our national security.

Aircraft Warning Test

Civil defense forces participating in Operation Lookout were called to action in New England by an ingenious radio alert system devised by the Radio Corporation of America for emergency use.

As more than a hundred Air National Guard pilots "raided" the east coast from Maine to Delaware, a signal was sent from a command post of the continental air command in New Hampshire to station WFEA, Manchester, N. H. There it was transmitted as an inaudible tone to station WBZ, Boston, and by that station to an "alert" receiver in the air raid warning center of Montpelier, Vt. This signal, which arrived only a few seconds after its original transmission, warned the defense staff that the raid was in progress.

In an earlier stage of Operation Lookout, which began on September 10 under the auspices of the continental air command and continued until noon, September 16, the warning signal originated at a command post on Long Island. Passing over private wire to the transmitter of NBC station WNBT at Port Washington, Long Island, the signal was added as an inaudible tone to the station program beams. It was received by an RCA alert receiver at station WGBI, Scranton, Pa., and retransmitted to civil defense headquarters in that city.

These demonstrations of the RCA alert receivers are the first conducted publicly since July 28, 1941, when existence of the warning device was revealed to the national director of civilian defense in the administration building at LaGuardia airport.

The alert receivers, developed at RCA Laboratories, resemble a portable radio set in size and simplicity. They are fixed-tuned to a broadcasting station which transmits an inaudible signal and may be used to warn thousands of civilian defense, law enforcement and military personnel in an emergency without interfering with other communications.

Depending upon the nature of the signal transmitted to the alert receivers, it is possible to inform civil defense authorities of the exact degree of emergency at any given moment through the ringing of a bell or the flashing of various colored lights. Persons listening to the signaling station with conventional receivers would be unaware that the warning signal had been transmitted.

The wartime JCC on Okinawa was a joint operation, and its personnel thought it ought to have an insignia representative of its service combination. So another joint effort was undertaken—"operation insignia." A letter to SIGNALS, published on this page, tells how the insignia idea was conceived and carried out. Because of its length and unusual interest the communication, from Lt. Col. Charles M. Baer, Signal Corps, is given this space rather than being included in the letters section.

Col. Baer is at present attending the National War College at Washington, D. C.

The story which drew Col. Baer's attention was "One Voice of Command" by Donald Becker. It appeared in the May-June 1949 issue of SIGNALS.

Above is the photo of the Joint Communications Activities' insignia as it appeared with the story, "One Voice of Command."

You can well imagine my very pleasant surprise upon turning to page 35 of the May-June 1949 issue of SIGNALS. In the upper right hand corner of that page, the insignia shown in the picture was the insignia of my largest command during World War II, Hq. Joint Communication Activities for the Okinawa Operation.

I thought it might be appropriate to brief you a bit on the background of that insignia. Lt. Gen. Simon Bolivar Buckner's 10th Army was designated Task Force 99, or CTF 99—Navy parlance for command echelons. Under him were the 24th U. S. Army Corps, the 3rd U. S. Marine Amphibious Corps and the Island Command, three of his major subordinate units. They were designated as task groups. Major General Fred C. Wallace was the Commanding General of the Island Command and was designated as Commander, Task Group 99.3 (CTG 99.3). Under General Wallace there were some seven-odd major subordinate commands, all designated as task units; one of those commands was the Joint Communicattion Activities; and I was the Commander, Joint Communication Activities, and was designated as Commander, Task Unit 99.3.7 (CTU 99.3.7).

The genesis of the insignia is about as follows: At a conference one evening, after I had been on Okinawa about L+45 days and the Naval complement of my command, about 100 officers and men strong, had arrived, the commander of my Naval communication units and I were discussing how well our activities were getting along, taking into consideration, of course, the difficulties under which we were working, i.e., all supplies and equipment coming over the beaches, rain coming down by the barrelsful, follow-up units to be assigned or attached to Joint Communicatiton Activities arriving as echeloned but without their equipment for periods of time from one to three weeks, and the Japs still maintaining a suicide defense on the island. Taking all of those things into consideration, we were going quite well, but we had no way of building up esprit within our organization. Finally, I turned to my Naval commander, Commander Jack S. Dorsey (USNA '30), and told him that we should have an insignia for our command since our strength within another month or so was going to be between eight and nine thousand officers and men, and in the Army, separate battalions and regiments all had their own distinctive insignia. I suggested that we might combine the anchor of the Navy with our crossed flags of the Signal Corps in such a way that the anchor would take the place of the torch of our crossed flags insignia. My administrative officer, a Captain McClelland, USMC Reserve, and, in civilian life, dean at Maryville College, Maryville, Tennessee, was listening, and when we finished the discussion, we all came up with a rough of the insignia noted in the picture on page 35 of SIGNALS. The idea for the insignia now was born, and it remained for a Navy SeaBee organization to actually produce it.

My only regret today is that when I left Okinawa in January, 1946, I did not pack that insignia with my gear, bring it back to the United States, and turn it over to the museum at Fort Monmouth. The command, Joint Communication Activities, was a most valuable one for me and it definitely proved that there were many advantages in working two signal or communication supply systems to support one integrated communication system; and with signal representatives of all services concerned in the command, any lack of confidence of the services other than that of the officer exercising command responsibility was allayed through the signal or communications representative of those other services in the Joint Communication Command. In other words, we had what I consider to be one of the most important essentials of joint communications, and that is joint confidence.

Incidentally, the Joint Communication Center referred to in the article, "One Voice of Command," contained in this May-June issue of SIGNALS, started operating before L+1. The battalion established a mobile communication center, which we designated as a temporary Joint Communication Center. As soon as Commander Dorsey came ashore, he was given operational control of not only this battalion but all other units that were necessary for the functioning of the temporary JCC.

I noted that the article referred to above mentioned the after-action report of the 10th Army. If you really are interested in what Joint Communication Activities accomplished during its life on Okinawa from L-Day until the end of August 1945, at which time our unified command was broken into separate Army and Navy Commands, with the Army commands coming under General MacArthur's headquarters and the Navy commands coming under Admiral Nimitz' headquarters, then I invite your attention to the after-action report put out by the Joint Communication Activities as a subordinate command of the Hq, Island Command, Okinawa, which is a report of operations against Okinawa Gunto to 30 June 1945. Although the 10th Army Operation Plan does not so indicate, Colonel Arthur Pulsifer, the 10th Army Signal Officer, after a conference with me before we mounted out from Oahu for the operation, very wisely placed the 3181st Signal Service Battalion, with its attachments, and depot Signal Corps troop units under my operational control, so that he had only to look forward of the Army C.P. for his communications, and it was my responsibility to take care of not only communications in his rear that would be necessary to support the tactical operation, but also that huge communications plant that we needed during the establishment and operation of all of the base facilities to be placed on Okinawa, roughly, one medium port, one major Naval operating base supporting a fleet anchorage, one Naval supply center, twenty-one airfields, and installations necessary for taking care of eight infantry divisions, two corps, and one Army headquarters, that were to mount out from Okinawa for the Olympis Operation. At its peak, in August 1945, the population of Okinawa itself was just short of 500,000 officers and men from all three services.

I trust that this background information for the insignia representative of Joint Communication Activities (CTU 99.3.7) for the Okinawa Operation will be of interest to you.

CHARLES M. BAER,
LT. COL. SIGNAL CORPS.

SHERRON WILL ANALYZE

→ **your electronic-mechanical problems**

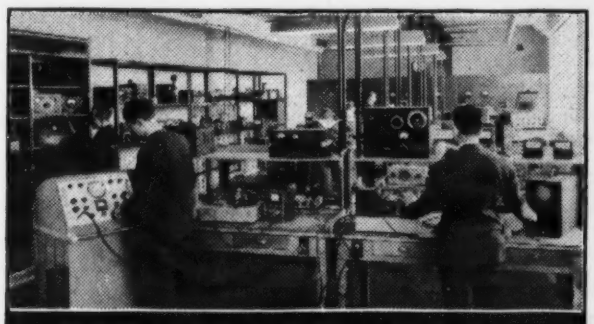
SHERRON WILL ENGINEER

→ **your design-development requirements**

SHERRON WILL MANUFACTURE

→ **your electronic equipment**

VIEW OF SHERRON ELECTRO-MECHANICAL LABORATORY



VIEW OF SHERRON ELECTRONICS LABORATORY

It's a start-to-finish service that Sherron offers. This includes getting at the core of your problem. It means designing and developing the equipment you need. It further means fabricating that equipment ready for efficient performance. In short, a comprehensive service. In all respects, a competent service. Confidential, of course, since Sherron is a manufacturers' manufacturer—exclusively.

DEVELOPMENT-DESIGN: This phase of Sherron Service is initiated in our electronics lab under the supervision of our Director of Electronic and Mechanical Research & Development Laboratories in collaboration with a full complement of experienced physicists, engineers and technicians.

ELECTRO-MECHANICAL LABORATORY: Seasoned graduate mechanical engineers with an uncompromising respect for precision electronics man this lab.

COMPLETE SHEET METAL FACILITIES: Sherron fabrication is a byword for distinctive, practical, completely serviceable equipment.

WIRING DIVISION: Production electrical engineers safeguard the safety, accuracy and neatness standards of this department.

Sherron can serve you in the design, development and manufacture of: Communications Equipment...Electronic Control Equipment...Vacuum Tube Circuit Development...Control of Measuring Devices...Instrumentation...Television Transmitters...Television Test Equipment...Test Equipment for Components.

RECENT SHERRON PROJECTS RELATING TO ELECTRONICS AND OTHER INDUSTRIES

COMMUNICATIONS

- *Trans-Receivers for various uses*
- *Television — FM — AM — Transmitters*
- *Navigational Devices, including Homing Equipment, Radar, etc.*
- *Micro-wave techniques and Radio Relay Links*
- *Ample Test Equipment to assure successful operation of above*

ELECTRONIC CONTROL EQUIPMENT for

- *Drone Aircraft Guided Missiles*
- *High Gain Amplifiers*
- *Computers and Calculators*
- *Servo Equipment*
- *Velocity Propagation measurement*
- *Test Equipment including Instrumentation for above*

VACUUM TUBE CIRCUIT DEVELOPMENT

- *New applications for existing vacuum tubes*
- *Precision test equipment for vacuum tubes*

CONTROL OF MEASURING DEVICES

- *Flow indicators*
- *Sorting, Counting*
- *Measurement of chemical titrations*
- *Surface strains, stresses, etc.*

INSTRUMENTATION

- *Bridge measurements*
- *Null detectors*
- *Vacuum tube voltmeter-ammeters*
- *Multi-wave shape generators*

TELEVISION

- *Television Signal Synthesizer Sync Generators*
- *Monoscope*
- *Shapers — Timers*
- *Wide band oscilloscopes*
- *Air monitors*
- *Field intensity equipment*
- *Television test equipment*

Sherron Electronics W2XOA

SHERRON ELECTRONICS COMPANY

Division of Sherron Metallic Corporation

1201 FLUSHING AVENUE • BROOKLYN 6, NEW YORK

The wartime JCC on Okinawa was a joint operation, and its personnel thought it ought to have an insignia representative of its service combination. So another joint effort was undertaken—"operation insignia." A letter to SIGNALS, published on this page, tells how the insignia idea was conceived and carried out. Because of its length and unusual interest the communication, from Lt. Col. Charles M. Baer, Signal Corps, is given this space rather than being included in the letters section.

Col. Baer is at present attending the National War College at Washington, D. C.

The story which drew Col. Baer's attention was "One Voice of Command" by Donald Becker. It appeared in the May-June 1949 issue of SIGNALS.

Above is the photo of the Joint Communications Activities' insignia as it appeared with the story, "One Voice of Command."

You can well imagine my very pleasant surprise upon turning to page 35 of the May-June 1949 issue of SIGNALS. In the upper right hand corner of that page, the insignia shown in the picture was the insignia of my largest command during World War II, Hq. Joint Communication Activities for the Okinawa Operation.

I thought it might be appropriate to brief you a bit on the background of that insignia. Lt. Gen. Simon Bolivar Buckner's 10th Army was designated Task Force 99, or CTF 99—Navy parlance for command echelons. Under him were the 24th U. S. Army Corps, the 3rd U. S. Marine Amphibious Corps and the Island Command, three of his major subordinate units. They were designated as task groups. Major General Fred C. Wallace was the Commanding General of the Island Command and was designated as Commander, Task Group 99.3 (CTG 99.3). Under General Wallace there were some seven-odd major subordinate commands, all designated as task units; one of those commands was the Joint Communicattion Activities; and I was the Commander, Joint Communication Activities, and was designated as Commander, Task Unit 99.3.7 (CTU 99.3.7).

The genesis of the insignia is about as follows: At a conference one evening, after I had been on Okinawa about L+45 days and the Naval complement of my command, about 100 officers and men strong, had arrived, the commander of my Naval communication units and I were discussing how well our activities were getting along, taking into consideration, of course, the difficulties under which we were working, i.e., all supplies and equipment coming over the beaches, rain coming down by the barrelsful, follow-up units to be assigned or attached to Joint Communicatiton Activities arriving as echeloned but without their equipment for periods of time from one to three weeks, and the Japs still maintaining a suicide defense on the island. Taking all of those things into consideration, we were going quite well, but we had no way of building up esprit within our organization. Finally, I turned to my Naval commander, Commander Jack S. Dorsey (USNA '30), and told him that we should have an insignia for our command since our strength within another month or so was going to be between eight and nine thousand officers and men, and in the Army, separate battalions and regiments all had their own distinctive insignia. I suggested that we might combine the anchor of the Navy with our crossed flags of the Signal Corps in such a way that the anchor would take the place of the torch of our crossed flags insignia. My administrative officer, a Captain McClelland, USMC Reserve, and, in civilian life, dean at Maryville College, Maryville, Tennessee, was listening, and when we finished the discussion, we all came up with a rough of the insignia noted in the picture on page 35 of SIGNALS. The idea for the insignia now was born, and it remained for a Navy SeaBee organization to actually produce it.

My only regret today is that when I left Okinawa in January, 1946, I did not pack that insignia with my gear, bring it back to the United States, and turn it over to the museum at Fort Monmouth. The command, Joint Communication Activities, was a most valuable one for me and it definitely proved that there were many advantages in working two signal or communication supply systems to support one integrated communication system; and with signal representatives of all services concerned in the command, any lack of confidence of the services other than that of the officer exercising command responsibility was allayed through the signal or communications representative of those other services in the Joint Communication Command. In other words, we had what I consider to be one of the most important essentials of joint communications, and that is joint confidence.

Incidentally, the Joint Communication Center referred to in the article, "One Voice of Command," contained in this May-June issue of SIGNALS, started operating before L+1. The battalion established a mobile communication center, which we designated as a temporary Joint Communication Center. As soon as Commander Dorsey came ashore, he was given operational control of not only this battalion but all other units that were necessary for the functioning of the temporary JCC.

I noted that the article referred to above mentioned the after-action report of the 10th Army. If you really are interested in what Joint Communication Activities accomplished during its life on Okinawa from L-Day until the end of August 1945, at which time our unified command was broken into separate Army and Navy Commands, with the Army commands coming under General MacArthur's headquarters and the Navy commands coming under Admiral Nimitz' headquarters, then I invite your attention to the after-action report put out by the Joint Communication Activities as a subordinate command of the Hq. Island Command, Okinawa, which is a report of operations against Okinawa Gunto to 30 June 1945. Although the 10th Army Operation Plan does not so indicate, Colonel Arthur Pulsifer, the 10th Army Signal Officer, after a conference with me before we mounted out from Oahu for the operation, very wisely placed the 3181st Signal Service Battalion, with its attachments, and depot Signal Corps troop units under my operational control, so that he had only to look forward of the Army C.P. for his communications, and it was my responsibility to take care of not only communications in his rear that would be necessary to support the tactical operation, but also that huge communications plant that we needed during the establishment and operation of all of the base facilities to be placed on Okinawa, roughly, one medium port, one major Naval operating base supporting a fleet anchorage, one Naval supply center, twenty-one airfields, and installations necessary for taking care of eight infantry divisions, two corps, and one Army headquarters, that were to mount out from Okinawa for the Olympis Operation. At its peak, in August 1945, the population of Okinawa itself was just short of 500,000 officers and men from all three services.

I trust that this background information for the insignia representative of Joint Communication Activities (CTU 99.3.7) for the Okinawa Operation will be of interest to you.

CHARLES M. BAER,
LT. COL. SIGNAL CORPS.

SHERRON WILL ANALYZE

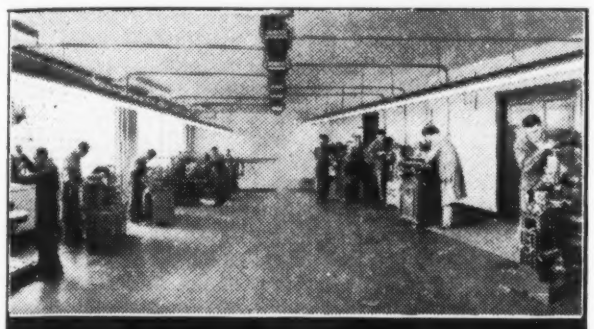
→ *your electronic-mechanical problems*

SHERRON WILL ENGINEER

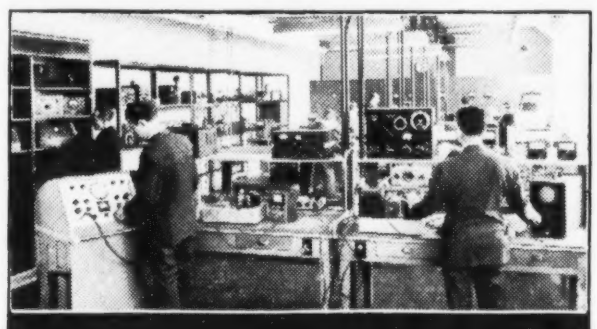
→ *your design-development requirements*

SHERRON WILL MANUFACTURE

→ *your electronic equipment*



VIEW OF SHERRON ELECTRO-MECHANICAL LABORATORY



VIEW OF SHERRON ELECTRONICS LABORATORY

It's a start-to-finish service that Sherron offers. This includes getting at the core of your problem. It means designing and developing the equipment you need. It further means fabricating that equipment ready for efficient performance. In short, a comprehensive service. In all respects, a competent service. Confidential, of course, since Sherron is a manufacturers' manufacturer—exclusively.

DEVELOPMENT-DESIGN: This phase of Sherron Service is initiated in our electronics lab under the supervision of our Director of Electronic and Mechanical Research & Development Laboratories in collaboration with a full complement of experienced physicists, engineers and technicians.

ELECTRO-MECHANICAL LABORATORY: Seasoned graduate mechanical engineers with an uncompromising respect for precision electronics man this lab.

COMPLETE SHEET METAL FACILITIES: Sherron fabrication is a byword for distinctive, practical, completely serviceable equipment.

WIRING DIVISION: Production electrical engineers safeguard the safety, accuracy and neatness standards of this department.

Sherron can serve you in the design, development and manufacture of: Communications Equipment...Electronic Control Equipment...Vacuum Tube Circuit Development...Control of Measuring Devices...Instrumentation...Television Transmitters...Television Test Equipment...Test Equipment for Components.

RECENT SHERRON PROJECTS RELATING TO ELECTRONICS AND OTHER INDUSTRIES

COMMUNICATIONS

- *Trans-Receivers for various uses*
- *Television — FM — AM — Transmitters*
- *Navigational Devices, including Homing Equipment, Radar, etc.*
- *Micro-wave techniques and Radio Relay Links*
- *Ample Test Equipment to assure successful operation of above*

ELECTRONIC CONTROL EQUIPMENT for

- *Drone Aircraft Guided Missiles*
- *High Gain Amplifiers*
- *Computers and Calculators*
- *Servo Equipment*
- *Velocity Propagation measurement*
- *Test Equipment including Instrumentation for above*

VACUUM TUBE CIRCUIT DEVELOPMENT

- *New applications for existing vacuum tubes*
- *Precision test equipment for vacuum tubes*

CONTROL OF MEASURING DEVICES

- *Flow indicators*
- *Sorting, Counting*
- *Measurement of chemical titrations*
- *Surface strains, stresses, etc.*

INSTRUMENTATION

- *Bridge measurements*
- *Null detectors*
- *Vacuum tube voltmeter-ammeters*
- *Multi-wave shape generators*

TELEVISION

- *Television Signal Synthesizer Sync Generators*
- *Monoscope*
- *Shapers — Timers*
- *Wide band oscilloscopes*
- *Air monitors*
- *Field intensity equipment*
- *Television test equipment*

SHERRON ELECTRONICS COMPANY

Division of Sherron Metallic Corporation

1201 FLUSHING AVENUE • BROOKLYN 6, NEW YORK

AFCA CHARTER MEMBERS

Following are the first members of the Armed Forces Communications Association—those who joined from May through August of 1946. The names are listed by month of joining.

MAY — 1946

Adams, Ira D.
Addington, James R.
Albee, Thomas L.
Allen, Charles L.
Allison, James B.
Anderson, John A.
Andreka, Joseph E.
Angeny, Ferdinand G.
Annas, Howard G.
Appleton, Louis B., Jr.
Arsenault, Orilla L.
Augustine, Wm. J.
Avery, Edward P.

Babcock, William S.
Back, George I.
Baer, George O.
Baker, Ben L.
Baker, Stuart K.
Baldwin, James W.
Ballin, Stanley L.
Baumann, John H. A.
Beasley, William A.
Beck, Irvin T.
Becker, John A.
Behm, Edward J.
Behn, Sosthenes
Behn, William C.
Bell, Charles M.
Benefield, Henry M.
Berman, Elliott
Bianco, Joseph F.
Bonsall, Thomas F.
Bowen, Francis C.
Bradley, Joe A.
Branam, Charles F.
Brandenburg, Richard L.
Brandstetter, John W.
Braswell, Clayton P.
Braun, Eugene
Brecher, Walter
Brinckerhott, John J., Jr.
Brown, Ben B., Jr.
Brown, Elwin O.
Brumfield, Florence C.
Bryant, David L.
Bryce, Clyde S.
Brymer, Oliver M.
Burwell, Albert L.
Buscall, David C., Jr.
Buss, Leo A.
Butler, Charles H.
Butler, Gordon W.

Campbell, Walter H.
Cardineau, Albert G.
Carr, Francis D.
Carros, Costas J.
Cecil, George H.
Cera, John
Cerwin, Steven S.
Challennet, Ansel
Christensen, Carl P.
Churchill, Harold B.
Cluver, Henry J.
Cohen, Sam
Cole, Robert S.
Cook, Carl L.
Cook, William G.
Coleman, William E.
Collins, Edward M.
Combs, Nathaniel A.
Coppock, Edwin S. C.
Corderman, W. Preston
Corona, Nicholas J.
Corsa, Lawrence J.
Cottle, Geo. T.
Cowan, Arthur S.
Cox, Herbert N.
Crist, James A.
Cutler, John C.

Dacy, Kenneth G.
Dakin, Hollis
Daniels, Henry
Davies, Roland C.
Deery, Hugh A.
Denkhaus, Walter F.
DeVaney, James O., Jr.
Dilliard, H. H.
DiMeglio, Nevio
Dominick, John B.
Driscoll, Walter F.
Duke, Thomas H., Jr.
Dutcher, H. W.

Elder, Eugene V.
Elleston, Fred A.
Ellis, Lavene E.
Engler, Ludwig R.
Ezell, Frederick J.
Falco, Nicholas T.
Fenner, Charles M.
Ferdon, Elliot M.
Fields, Leon
Fleischl, Maurice M.
Franzoni, F. Royce
Freytag, Walter P.
Fredenburg, Arthur M.
Flook, Kenneth G.
Floyd, Leland H.
Flynt, Edward R.
Foltz, Richard E.
Fon Eisen, Nicholas E.
Ford, Max D.
Foltz, William E.
Fuchs, Frederick W.

Gale, Thomas R.
Galligan, John H.
Gannon, William J.
Ganzert, Neal F.
Garman, Donald A.
Gernsback, M. Harvey
Geisinger, Henry R.
Gibbs, Charles W.
Gimlick, Russell W.
Godfrey, Kenneth W.
Goebel, Robert J.
Green, Glenn M.
Green, John H.
Green, James W., Jr.
Greene, Martin
Greffe, Howard J.
Greulich, Richard A.
Grohs, Louis H.
Grossman, Richard L.
Gustafson, G. E.

Hallaman, Joe C.
Hamlin, Wm. D.
Hardy, Edward J.
Hart, Stanley E.
Hayes, Edward K.
Haynes, Orren E.
Hazel, Woodrow M.
Heaton, Edward C.
Henessy, Francis X.
Hendrickson, Everett H., Jr.
Hertsche, Joel C., Jr.
Hildreth, Raymond C.
Hill, Boyd B.
Hitchcock, Harry W.
Holland, Thomas M.
Holster, Douglas
Hort, Henry J.
Houk, Joseph E.
Hubbard, James B.

Ingles, H. C.
Irby, Vernon C.
Irwin, Gordon C.

Jacobson, Hugo W.
James, Joseph E.
Johnson, Edwin H.
Johnson, William J.
Johnston, Thomas F.
Jordan, Raymond C.
Joy, Wilbur R.
Joyce, Stephen R.

Kaiser, John D.
Karter, Oswald D.
Kelly, William A.
Kendall, David M., Jr.
Kennedy, Robert M.
King, Philip S., III
Kirk, Wilson O.
Kirkhart, Kenneth
Kisseberth, Irvin M.
Kleinau, C. S.
Knoblock, Edward J.
Kohl, Ralph A.
Kopple, Robert
Kuba, John
Kuch, Herman F.
Kuesel, Frederick H.
Kunigonis, Peter T.
Kyne, Theodore

LaBrum, J. Harry
Lack, Frederick R.
Lams, Jules E.
Lang, Charles M.
Larson, Vernon R.
Leas, John W.
Lenzner, Emil
Lilienfeld, Jacob
Link, Eugene M.
Lindner, George
Lion, Beverly D.
Lipe, Ernest B.
Lloyd, Lawrence E.
Lofer, Louis S.
London, William J.
Lough, Frederick C.
Lowe, John A., Jr.
Lucas, Daniel

Macarow, John C.
Maffett, Harry S.
Major, Thomas W.
Malnight, John D.
Mann, Robert N.
Marquardt, J. Walter
Marshall, John T.
Martin, James
Mason, Hale, Jr.
Mauborgne, J. O.
Mayer, Walter S., Jr.
Meier, Robert A.
Menagh, Francis H.
Meyer, Gilbert A.
Miller, David C.
Miller, Kassel K.
Mongan, Leo P.
Monteith, Charles D.
Moore, Frank A.
Murich, Frederick E.
Myers, Lester J.
McDonald, Walter F.
McGowan, Hugh F.
McHugh, Chas. X.
McKeever, Daniel A.
McNeil, Walter H.

Neal, Bernard N.
Neary, James E.
Newlin, Charles A.
Niemi, A. N.
Nelson, Lloyd A.
Northrop, Edward D.

Ohl, David E.
O'Leary, Morgan J.
O'Laughlin, Thos. J.
Osborne, H. F.

Pernice, John E.
Petersam, S. Margareth
Philip, Van Ness
Phoebus, John W.
Pope, Hughlan W.
Porter, Robert S.
Poteet, Robert W.

Quatman, Frank T.
Quatman, George B.
Quednow, Herbert P.
Quinlan, Paul F.

Reed, Joseph V.
Reed, Walter, Jr.
Reeder, William O.
Reynolds, Helen M.
Reilly, John M.
Rice, Harold W.
Ritchie, Chad M.
Roberts, John M.
Roberts, Harold S.
Roche, Cornelius F.
Roistacher, Herbert D.
Rose, Thomas G.
Ross, Douglas M.
Rosso, Frank P.
Rumbough, William S.
Russ, L. J.

Sadtler, Otis K.
Sarnoff, David
Sarnott, Edward
Saunders, Lynn B.
Saunders, William P.

Sawyer, John A.
Scott, Clarence E.
Schumann, Leo I.
Shaw, David
Schenck, Wm. E.
Sherrill, Stephen H.
Shultz, Cameron W., Jr.
Simmons, Vernon N., Jr.
Skardon, James W.
Skibbe, George A.
Smith, Clifford W.
Smoller, Rene G.
Snow, Conrad E.
Snow, Harold E., Jr.
Sprague, Harold W.
Staron, Frank J.
Stoner, Frank E.
Susk, Henry M.
Spear, Robert L.
Swartz, John H.
Sweeny, William S.

Tawzer, Wm. E., Jr.
Taylor, Richard L.
Tennant, James M.
Todd, Samuel R.

Uhler, David M.
Unger, Samuel

Van Allen, Ralph C.
Van Deusen, Geo. L.
Van Harlingen, Wm. M.
Vezzetti, Harold B.
Vitzthum, Harry L.

Waldschmidt, Wm. H.
Watson, James T., Jr.
Weaver, Richard A.
Welde, G. A.
Wells, Paul I.
Williams, Grant A.
Williams, Winston
Wood, William H.
Woods, Don E.
Williamson, Thomas L.
Worrell, W. Parker
Wyant, Woodrow

Zahl, Harold A.
Zdanowicz, Joseph J.

JUNE — 1946

Abernathy, F. R.
Abernathy, Robert B.
Abbitt, William A.
Abbott, Gilbert C.
Accardi, Joseph
Adimari, Frank
Ahern, Joseph P.
Akerman, Russell S.
Albright, Owen S.
Alexander, Jesse K.
Allen, Jimmie C.
Allen, Thurman L.
Allison, J. M.
Allman, Sydney K.
Anderson, Lawrence A.
Angel, Clyde S.
Anstine, LeRoy T.
Armstrong, Paul R.
Arndt, Wm. O.
Arnold, Calvert H.
Arnold, Claude B.
Arnold, Emmett R.
Arnold, John W.
Arnold, Robert H.
Asleren, Eric C.
Augrine, Richard A.
Augustus, Robert W.
Axelrod, Seymour S.

Baker, Dudley N.
Baker, William P.
Baker, William W.
Baldwin, Geo. O.
Bales, Charles A.
Balugo, Jaime
Banta, Lucas V.
Barbour, Samuel H.
Barclay, Charles A.
Barker, Jabus
Barnsbee, Alexander E.
Barry, James F., Jr.
Bartgis, James E.
Barth, Howard E.
Bastone, Samuel H.
Batky, Robert G.
Batley, Robert D.
Baum, Edwin K.
Baylor, Robert N.
Beach, Raymond F.
Bean, Arthur W., Jr.
Bearden, Robert H., Jr.
Beatty, Dana C.
Beck, Merrill G.
Bedrossian, Peter S.
Beeson, Coleman E.
Behler, Robert J.
Beirne, John L.
Bell, Louis F.
Benjamin, Joseph N.
Bennett, John
Bennett, Marvin D.
Bennett, Max B.
Benoit, Bernard A.
Berard, Marshall A.
Berg, Robert H.
Bernnard, William V.
Bernstein, Max
Berry, D.
Bethge, Charles E.
Bider, J. G.
Biltz, Francis J.
Black, Henry S.
Black, James C.
Blankley, Harold W.
Blotz, John B.
Boatright, Burton C.
Bock, Arthur S.
Bogardus, Clifton, Jr.
Bohannan, Robert C.
Boice, John D.
Boland, John F., Jr.
Bond, Charles A.
Bond, Frederick E.
Bond, Robert N.
Bondelick, Joseph
Borman, Alvah K.
Bodkin, John L.
Boucher, Arnold E.
Bowen, Ronald G.
Bowman, William T.
Bowser, Childs E.
Boyd, Paul W.
Boylan, David R.
Boynton, James C.
Bradshaw, Chas. C.
Brauer, Robert W.
Brauneck, Chas. F.
Breitenbach, Paul
Breed, Walter E.
Brill, Herbert B.
Brill, Myer
Broberg, Charles P.
Brody, Howard A.
Broemsen, Frank H.
Brown, Ben T.
Brown, Howard W.
Brown, William J.
Brown, William R.
Brown, William T.
Brownley, Harold M.
Brownson, Fred W.
Brudner, Irving
Brumbaugh, Paul R.
Bruner, Leonard L.
Bryan, Daniel J.
Bryan, Frank N.
Buchanan, William L.
Burden, William D.
Burgess, Albert F., Jr.
Burke, James F.
Burt, John B.
Bussey, E. Richard
Burwell, Henry W.
Butler, Herbert H.
Butler, Jonathon
Butt, Leo M.
Buttel, Harry F.

Cahill, Jas. D.
Calidonna, D. J.
Callahan, Stephen E.
Caloway, Charlie C.
Calvin, Lloyd D.
Camp, Eldridge K.
Campbell, Harry S.
Cane, Donald B.
Cannity, Guy G.
Cannon, Robert S.
Caplan, Sidney R.
Capra, Frank
Carmichael, E. J.
Carroll, William V., Jr.
Carter, G. G., Jr.
Cash, John F.
Cattanach, Warren H.
Cattilini, Edward E.
Cavanaugh, Gordon M.
Cavanaugh, Ralph S.
Cavanaugh, Stephen P.
Chambers, Roy C.
Chaney, Edwin C.
Childs, Harris A.
Chlupse, Richard W.
Christensen, Donald F.
Christoph, Roy J.
Clark, Charles E.
Clark, Homer E., Jr.
Clark, Virgil M.
Clark, John J., Jr.
Clark, Maurice E.
Clark, Ralph C.
Clay, Robert E.
Clarke, Norman F.
Clay, Carmon L.
Clemens, Robert H.
Cobb, Donald W.
Coburn, Winston N.
Coccia, Julius
Coe, Carl W.
Coffey, John W.
Cohen, Milton S.
Cole, James E.
Collins, Earl J.
Colpitts, Arnold L.
Commark, Owen F.
Comisky, Marvin
Conat, Arthur L.
Congdon, Clinton P.
Connor, Edward J.
Conoley, Alexander G.
Conrad, Robert
Convertino, Joseph D.
Cook, Myer
Cooper, Airel B.
Corbett, Harvey G.
Cotell, Robert D.
Cottrell, Alfred
Cover, Edward C.
Cowan, Donald C.
Cox, William H.
Cunningham, Homer R.

Dansby, Robert E.
Davenport, Philip B.
Daverin, George E., Jr.
Davidson, Roger E.
Davidson, Saul B.
Davis, Ben M.
Davis, Harry M.
Davis, Ray
Day, Russell S.
Deets, Jack L.
Deicks, C. H.
Dentz, Walter R.
Deucker, Ralph F.
Devine, Paul F.
Dexter, Louis H.
Diamond, Albert
Diebold, Barney A.
Diehl, Forrest V.
Dinger, Paul C.
Diver, William L.
Doctor, Robert C.
Donohue, John H.
Doolittle, Joseph B.
Dorney, James J.
Dougherty, Jonas F.
Downing, Robert E.
Duneback, Fred J.
Dungaen, John D.
Dunloy, Deane A.
Dunscombe, John A.
Dussi, Ivo M.
Dodge, Robert I., Jr.
Duetto, Attilio
Duncan, Donald D.
Duva, Edward A.

Eaby, David R.
Early, Charles D.
Edberg, Robert A.
Edelstein, Sam
Edwards, David F., Jr.
Ehrhart, Albert L.
Eichhammer, A. A.
Eisen, Chas. J.
Ellis, Robert F.
Elwood, Hacland D.
England, Carl D.
English, Donald A.
Engstrom, Albert D.
Erckman, Chas. D.
Etchison, Gibson A.
Evans, George G.
Evans, Willard F., Jr.
Everett, Paul E.

Fairlie, Henry D.
Falk, Stuart A.
Fall, Dellvon K.
Fay, Alexander H.
Fay, Harold M.
Feindel, William B., Jr.
Feldman, Oscar
Ferguson, Ernest E.
Fesus, Joseph E.
Fickle, Lorin E.
Figua, Harry G.
Filiberti, George J.
Finn, Robert S.
Fisher, Alexander
Fisher, Robert R.
Fishman, Herbert J.
Fitzpatrick, John P.
Fisher, J.
Flashman, Joseph J.
Fletcher, Wm. E.
Flint, George
Florman, Nathan J.
Flowers, Viola C.
Foldes, Stephen
Ford, John F.
Francis, Thomas L.
Frank, David
Franklin, Harry S.
Franklin, Robert F.
Freeman, Belknap
Freindly, Fred
French, Wilbur C.
Frewski, Stanley E.
Friedberg, Marvin S.
Froke, Lester C.
Frost, Herbert H.
Fry, Alvin A.
Fuchs, William N.
Fulsher, Howard D.
Fulton, Wilbur D.
Funnell, Chas. R.
Furlong, Gerard D.
Furman, Robert E.

Gaffner, Ramon W.
Gale, Stanley E.
Ganteaume, Paul A.
Gates, Frank L., Jr.
Geiser, Peter H.
Gerlach, Albert A.
German, Frederick A.
Gernstner, John F.

Getchell, Melvin D.
Gibbs, David P.
Gibbs, George S.
Gibbs, Henry F.
Giebel, Robert R.
Gifford, Allan E.
Gilson, Richard A.
Given, Thomas L.
Godfrey, Kenneth
Godown, Jacob F.
Goetz, Louis P.
Goldberg, Daniel L.
Golden, Simon S.
Gooding, Lorenzo E.
Goodman, Kenneth C.
Goodson, Thomas
Gorman, James J.
Graham, George N.
Grasberger, William E.
Green, Myron J.
Green, Raymond
Greenberg, Saul L.
Greene, Arnold H.
Gregorski, Walter J.
Greve, Raymond
Griffin, E. Maesa
Grigger, William
Gropp, Edward J.
Grubbs, Glenn E.
Grube, Wolfgang
Grupp, Doris J.
Guidice, Louis V.
Guthridge, Paul F.

Haas, Max L.
Hagan, John V., Jr.
Hagberg, John E.
Hager, Franklin M.
Hall, Henry S.
Halstead, William R.
Hamburt, Lester A.
Hamill, Bazil W.
Hamme, Richard J.
Hammerly, Harold C.
Hammond, Elton F.
Hammond, Jackson A.
Hammond, Kenneth D.
Handleman, Marvin
Hansen, Boyd S.
Hansen, Howard M.
Hansen, Richard W., Jr.
Hanson, Henry N.
Harley, Harold E.
Harper, Wm. E.
Harrington, Donald J.
Harris, John T., Jr.
Hart, Edward J.
Hasie, Pat W.
Hawkins, Stanberg H.
Hawthorn, Arthur S.
Hawthorne, Herbert M. E.
Hays, Chas. S.
Heel, Thomas F., Jr.
Helsel, Dayl M.
Hemerda, Louis
Hemphill, John E.
Hempstead, Donald E.
Henry, James J.
Henry, William C.
Herbig, E. T., Jr.
Hertzel, Robert W.
Heuermann, Eugene M.
Hickey, Robert E.
Hickman, Lawrence E.
Hicks, Dr. Laurence C.
Hicks, Orton H.
Hiestand, Douglas W.
Higgins, Arthur A.
Hiller, Robert R.
Hillier, Royal A.
Hindle, Carlton T.
Hinemon, John H., Jr.
Hirsch, Gustav
Hitchcock, George W.
Hodges, Duncan
Hoeflick, Charles J.
Hoffman, Richard M.
Hoffman, Wm. O.
Hogerton, Sidney F.
Hogue, Trudeau J., Jr.
Holiman, Thomas M.
Hollander, Lawrence L.
Holly, Kenneth R.
Holmes, Alonzo
Holt, Hiland J. D.
Hooker, Walter P., Jr.
Hope, Thomas W.
Hopkins, James S.
Horn, Francis C.
Hornbake, Alan W.
Horney, Daniel S.
Horning, Vernon G.
Horvath, John
Houck, David W.
Howard, Clifton M.
Howell, Gerald A.
Howell, Horace J., Jr.
Howland, John R.
Huddleston, Wilbur I.
Hughes, Henry C.
Hunt, Woodrow W.
Hunter, Howard V.
Hutchings, Wm. R.
Huth, Louis G.
Hyland, Martin J.

Ingalls, Phineas H.

Jackson, Clyde H.
Jackson, D. A.
Jackson, Paul H.
Jacobs, Frederick L.
Jacoby, Paul R.
Jamato, Joseph
Jaszczult, Thaddeus P.
Johnson, Bertram C.
Johnson, George V.
Johnson, Harold E.
Johnson, Orland K.
Johnson, Philip H.
Johnson, Robert A.
Johnson, Robert E.
Johnston, George F.
Johnston, Joseph M.
Johnston, Ralph S.
Jones, James T., Jr.
Jones, John W.
Jones, Lyle M.
Jordan, Dudley W.

Kaden, Edward
Kahmer, Louis V., Jr.
Kain, Richard J. E.
Kaladish, Max
Kane, Arthur P.
Kappel, Jerome E.
Katzen, Harry R.
Kauffman, Christian D.
Kegebein, Harold A.
Kelley, Taiton L.
Kelley, William A.
Kelly, Raymond E.
Kelsey, J. E.
Kemper, Richard V. D.
Kendall, Alex J.
Kent, Eugene E.
Keresey, H. Donn
Kershaw, James R.
Kidwell, F. E.
Kiem, Richard F.
Kiernan, John B.
Kilborn, Angus O.
King, Paul M.
Klein, Albert
Knell, Robert L.
Knox, James T. N., Jr.
Koch, Kenneth J.
Koenig, Elmer P.
Kolar, Anton
Kolb, Elmer R.
Koppes, Lawrence M.
Kozlowski, George J.
Kramer, Gerald J.
Kramer, William E.
Krawczyk, Marcy J.
Ktistes, Peter J.
Kubena, Woodrow W.
Kuhlmann, Frederick J.
Kunkel, George L.
Kuvallis, John N.

Lader, Robert
Lakin, John W.
Langguth, Paul O.
LanZeem, Wm. H.
Larrabee, Thomas J.
Larser, Wm. L.
Lascaris, John L.
Lauson, Richard E.
Lawless, Roger E. J.
Lawloy, Richard D.
Laws, James R.
Lawton, Richard
Leary, Frederick J.
Leaver, Albert C.
Leidenheimer, John L.
Lemkin, Arthur W.
Lemoine, Louis H.
Leonard, Rudolph L.
Lester, Elmer S.
Letts, Marney
Levine, Moe
Levy, Henry K.
Lewis, Robert L.
Liebig, Richard A.
Lincoln, William T.
Lindsay, Ronald W.
Linsley, Scott E.
Little, Frank, Jr.
Littlejohn, Alex
Lockhart, Wilson L.
Long, Robert R.
Louisigan, Robert F.
Lovemon, David B., II
Lowdermilk, Lee O.
Lowman, L. W.
Lumpkins, Luther D.
Lyons, Cecil R.

Mabry, James H.
MacGaw, Bradford K.
MacKernan, James L.
MacLafferty, James W.
Macon, Hugh
Madden, James E.
Maher, Edward T.
Maier, Robert
Maloney, Robert W.
Manascu, Benj. B.
Mandy, Michael S.
Manghi, Gene
Manitsas, Christos M.
Marco, Sidney V.
Margolies, Harry
Margolis, Herman R.
Martin, Richard W.
Martin, Robert D.
Markel, Morris L.
Marlow, Harry A.
Mason, Will G.
Matheny, Willard R.
Matheson, Robert M. M.
May, Clarence W.
Mayers, Joseph P.
Meck, John S.
Medcalf, Frank W.
Metcalf, Elliott F.
Metcalf, Herbert E.
Middlemis, Burdette M.
Middleton, Wm. W.
Miller, Gerald E.
Miller, Harrod G.
Miller, Horatio
Miller, Matts M.
Mitchell, Frederick W.
Miller, Samuel C.
Miller, Seymour W.
Milne, David S.
Moeller, Lowell J.
Montgomery, Earle S.
Montgomery, Francis E.
Montgomery, James B.
Moore, John T.
Moore, Lowrey R.
Moore, Thomas R.
Moore, Thomas G.
Moran, William M.
Morgan, Donald R.
Morgan, Howard E.
Morgan, Roland F.
Morris, Henry R.
Morris, Samuel F.
Mossman, Donald P., Jr.
Motsinger, Clifford L.
Mount, Mark L.
Mullican, James E.
Munson, Edward L., Jr.
Muscar, Petro J. C.
McCourt, Andrew W.
McCracken, Horace J.
McShane, Rudolph M.
McCarville, Andrew J.
McDermott, Thomas J.
McGinnis, Joel J.
McGowan, James R.
McIlwaine, George W., Jr.
McKinney, D.
McKittrick, Kenneth F.
McLeary, Arthur
McNally, George J.

Needham, Peter J.
Nehart, Stephen M.
Neiman, S. I.
Neislar, J. T.
Nelson, Donald M.
Nelson, Raymond A.
Nesbitt, John E.
Newton, Harold D.
Nolan, Patrick T.
Norton, Wm. V.
Nutt, James D.

Oberg, Phillip A.
O'Donnell, James F.
O'Donnell, John F.
O'Gara, John E.
Ohnemus, Paul M.
Ojala, Arvo
Olier, Mike F.
Olson, Richard N.
O'Meara, Wm. F.
O'Neal, George R.
Opie, Sidney P.
Orr, Benjamin N.
Osterhardt, Thomas G.
Ottgen, Orville E.
Ouriet, Paul
Owens, Leonidas H.
Owens, Robert E.

Page, Esterly C.
Parent, Vearl A.
Park, Wm. C.
Parker, Robert J.
Patrick, Raymond E.
Patton, Marshall J.
Paul, Elmer W.
Pecci, Angelo C.
Peck, James H.
Pendleton, Dwight L., Jr.
Perez, Reinardo R.
Perkins, Walter E.
Peschel, Alexander
Petrov, Nicholas V.
Pettyjohn, Floyd N.
Phildiuss, George P.
Phipps, Chas. H., Jr.
Pietsch, Howard R.
Popkess, G. Edwin, Jr.
Powell, Frank P.
Powell, Byran F.
Preis, Lehman K.
Preston, Lloyd R.
Price, David S.
Price, Merrick B.
Prideaux, G. F.
Prosser, Walter E.
Prowse, Samuel W.
Pryor, Thomas S.
Purchia, James

Quinn, Joseph F.
Raduauski, Max P.
Rae, Eugene F.
Ramsey, Marion A.
Ramsey, Wm. H.
Randall, Burke D.
Randolph, Fred F.
Rankin, Jos. F.
Raty, Raymond
Rea, William N.
Reed, Charles L.
Reeds, Marcel C.
Reed, Robert W.
Redfield, Don
Redmond, John D.
Regan, Lewis B.
Reidy, Philip
Reip, Elizabeth C.
Rhudy, James T.
Richards, Roy T.
Riddle, H. W.
Rideout, Eugene W.
Rielly, Francis J.
Riggs, Robert H.
Rinker, Lyman G.
Ringland, Edward O.
Rising, Richard L.
Rittenhouse, Paul H.
Robertson, Robert
Robinson, Clark S.
Robinson, Myrtland G.
Robinson, Elmer
Robinson, Spencer J.
Rogers, George J.
Rose, Bernard
Rosenfield, L. A.
Ross, Donald C.
Ross, James B.
Rosser, J. P.
Roth, Irwin
Rountree, Clyde B.
Rous, Louis
Rowlett, Bruce R.
Royce, William S.
Ruano, William J.
Rubenking, Lewis J.
Rumbaugh, James R.
Ryan, John V.
Ryan, Mary C.
Rykert, George L.

St. Clair, Orla
St. Clair, Ward K.
Samiljan, James
Sandler, William
Sarles, Lien C.
Savacool, William C.
Savelkoul, Donald C.
Sawyer, Brooke
Sawyer, Neil G.
Scace, William B.
Scott, Chas. L.
Schechtman, George
Schick, George A.
Schiff, Israel
Schmidt, Jos. A.
Schnoor, Ernest E.
Schoen, Donald R.
Schrader, Albert T.
Schwarz, Raymond A.
Schweitzer, Jos. S.
Scott, Harold B.
Scott, John M., Jr.
Scurlock, James P.
Sdao, William L.
Searles, Howard J.
Seay, William R.
Seifer, Daniel
Sears, Russell W.
Seip, William H.
Seiper, Daniel
Seipert, Frederick F.
Selenski, Leonard
Sell, Paul
Sery, Ernest A., Jr.
Severson, Harry C.
Shafransky, John P.
Sharp, Samuel M.
Shepherd, Maurice F.

Shreve, Joseph E.
Shields, Aaron C.
Shields, Chas. C., Jr.
Shmishkiss, Stanley
Shockley, Thomas R.
Shumer, Arthur J.
Shurtleff, Franklin A.
Shute, Donald M.
Sibbet, John R.
Sickler, Cecil I.
Single, Arthur W.
Sischo, Floyd F.
Sjoborg, F.
Skillman, Theodore J.
Skinner, Chas. E.
Sloane, Marcia E.
Sloan, Roy R.
Sloope, Guy L.
Smith, Charles E.
Smith, Charles R.
Smith, Daugherty M.
Smith, John E.
Smith, Raymond C.
Smith, Thomas B.
Smith, Vincent J.
Smith, Brent L.
Smith, Cyril U.
Snellback, Donald F.
Snoots, S. Wynne
Snyder, Spencer T.
Sonnier, John J.
Sorenson, Forest J.
Soules, W. F.
Sparks, Morris M.
Spencer, Thomas H.
Spicci, Morris V.
Spiegel, Louis H.
Spiro, Meyer J.
Spivey, Melvin L.
Stacey, Thomas B.
Stange, Walter B.
Stanton, Chas. A.
Starling, John N.
Stebbings, Robert W.
Steele, Raymond E.
Stephenson, David G.
Stevens, Frank D.
Stevens, Frank O.
Steele, Robert H.
Sterling, Henry
Stern, Eugene C.
Stires, Frederick H.
Stodter, Charles S.
Stoklosa, O. J.
Stopple, Wm. J.
Stowell, Allen I.
Strade, Frederick M.
Strothman, Thomas H.
Strunc, Charles L.
Streech, Wilbur J.
Sullivan, John P.
Sultzer, Morton
Summers, Atmer W.
Sweatt, Wm. A.
Swede, Allen G.
Sweeney, James W.
Swidelsky, John E.
Swinnerton, A. C.

Tager, Arthur W.
Taylor, G. E.
Taylor, Wesley B.
Tennyson, Benjamin E.
Tennyson, Lee S.
Tibbetts, Wm. D.
Tepel, Louis
Thacker, Wilbur W.
Thingelstod, Clifford S.
Thomas, George
Thomas, Grace L.
Thomas, Lee E., Jr.
Thomas, Leonard O.
Thompson, Ralph C.
Thomson, Wm. H.
Todd, John R.
Tomlinson, Albert S.
Tompkins, Thaddeus C.
Toney, Wm. C.
Toussoint, Theodore A.
Townsley, Freeland P.
Tracy, Harold C.
Tretler, Francis P.
Troutman, Frank R.
Tryon, John G.
Tucker, Clyde E.
Turner, Wayne K.
Tuxworth, Frank E.

Ulrich, Frederick C.
Unis, Gabriel P.
Ursprung, Allen J.
Uslan, Jess

Vafias, Eugene D.
Valente, Robert L.
Van Camp, Frank E.
Van Den Abell, Rominick A.
Vandergrift, Wayne J.
Van Leon, N.
Varner, Herbert A.
Vaughn, Clarke S.
Vincent, Walter N.
Vinip, Frank
Vinquist, Glenn M.
Voorhees, E. E.

Waddingham, Ernest M.
Wagner, Chas. R.
Walburn, George W.
Walker, Cecil E.
Walton, George C.
Ward, Jacob L.
Ward, Suey-Way Wong
Washington, Raymond L.
Watkeys, Wm. B.
Watts, Lawrence
Weaver, Perry J.
Weinberg, Morris
Welsh, Stuart M.
Weisbrich, R. A.
Weller, Donald A.
Wendell, Gordon McE.
Werthmann, F. J.
Wetmore, Geo. C.
White, Jesse D.
Whitlock, Foster B.
Whitney, David J.
Whitney, Vernon E.
Whitton, Chas. H.
Wight, Richard M.
Wilbur, Mary E.
Wilkes, John
Wilkins, Marion K.
Will, Ralph W.
Wills, James E.
Williams, Nehry W.
Williams, Robert
Williams, Robert O.
Williams, Royal M.
Willmott, Robert W.
Wilson, Mary H.
Winkler, Irving
Winston, Carlyle D.
Winterich, Otto C.
Winton, Robert W.
Wolf, Robert W.
Wolheim, Elliott
Wood, C. C.
Wooldridge, W. B.
Woollen, Chas. E., Jr.
Worman, John W.
Wozencraft, John M.
Wyatt, Charles E.

Yeary, Walter R.
Yingst, Paul V.
Youngblut, Emille E.
Youngquist, Frederick E.

Zalmas, Geo. W.
Zazzi, Melvin A.
Zinkoff, Daird
Zischkan, William C.
Zuegel, Fred D.
Zolten, Abe
Zwart, Cornelius

JULY — 1946

Abbott, Frank H., III
Acree, Charles H.
Adams, Donald L.
Adams, F. M.
Adams, William
Agau, Albert A.
Agne, Howard C., Jr.
Spencer, B. Akin
Albeen, C. E.
Albert, C. A.
Alberts, Joseph C., Jr.
Albright, Jack A.
Albright, J. R.
Allan, Richard S.
Allen, Alford E.
Allen, Roger S.
Allison, J. H.
Allrid, J. W.
Amos, Everitt M.
Andersen, Wesley
Anderson, Paul R.
Andreasen, Lawrence R.
Andrews, Francis J.
Anton, G. S.
Arkin, Harvey
Armor, Paul C.
Atkinson, Victor W.
Austin, F. B.
Auten, Frederick B.

Bachman, Gainer
Bacon, Lawrence W.
Badger, Florence
Baer, Charles M.
Bagley, George F.
Bairos, Cyril A.
Baker, R. B.
Barch, Burnett F.
Baran, Edward A.
Barker, Ernest B.
Barnard, Chas. F.
Bassett, Allan C.
Bateman, Paul E.
Batson, R. A.
Baumbach, Earl T.
Bauman, Robert H.
Baumgartner, Donald P.
Bayner, Joseph N.
Beall, Joseph R.
Beard, George S.
Behn, S., Jr.
Bell, J. A.
Beaton, Clifford M.
Beatty, Jerome D.
Bellino, Pasquali
Bendick, Paul
Bergstein, Meyer I.
Berlin, Bernard A.
Berry, David N.
Betkinson, Ralph G.
Beyer, Florian B.
Bickhardt, Albert F.
Binghirm, P. L.
Bird, Retaud E.
Biren, Fred P.
Bishop, Lillian M.
Bitler, John R.
Bittner, Don J.
Blake, Gordon A.
Blanchard, Ross C.
Bleecher, Gerald
Blencoe, S. G.
Blezier, Harold H.
Bloom, Edmund S.
Bodius, D. R.
Book, Edgar P.
Borden, J. R.
Borglune, G. D.
Bourbonnais, Telesphore L., II
Bowman, David W.
Bowman, John R.
Bowman, Shannon D.
Bowyer, Wm. L.
Boydstun, Alfred E., Jr.
Bradford, Paul P.
Braly, Earl B.
Brarein, C. D.
Brembt, Ralph C. O.
Brengal, Dexter
Brice, John E.
Brogle, Albert P., Jr.
Buck, Donald G.
Brooke, R. G.
Bromell, Ruth I.
Brosz, Melvin W.
Brown, Carolus A.
Brown, Earl
Brown, Joseph E.
Buchanan, E. R.
Bucci, Cesare A.
Bucy, Roy T.
Buck, Lawrence L.
Buchak, Kirk
Buford, Meriam T.
Bunch, Adam Z., Jr.
Bullier, Gould G.
Bunkle, Samuel C.
Burgess, Richard W.
Burke, Alvin L.
Burns, Robert W.
Burton, Norma E.
Bush, John A.
Butt, H. R.
Byer, Vernon W.
Byrnes, J. T.

Caffery, Prather E.
Cahoon, Albert J.
Calhoun, Wm. G.
Call, Dale E.
Cannon, Wm. J.
Carlsten, Chester A.
Campbell, Charles E.
Capace, Cosmo F.
Carlo, Michael
Carpenter, Vernon D.
Carroll, Harry J.
Carter, Douglas H.
Carvell, Jim R.
Casper, Edward F.
Causey, Alfred
Cave, Jere S.
Chambers, John T.
Chambers, Kenneth M.
Chapple, Joseph L.
Chapman, Margaret
Charles, O. G.
Choc, George A.
Christensen, Willard W.
Christopher, Glen J.
Clark, Arthur E., Jr.
Clark, Elizabeth
Clark, Howard H.
Clark, Jos. F.
Clark, Robert T.
Clark, Willard R.
Clarke, C. W.
Claussen, Lyle W.
Coffey, Melvin W.
Coffin, Edward C., Jr.
Cole, Daniel C.
Coleman, D. B.
Colman, John R.
Coleman, Will R.
Collier, Albert A.
Collin, Fred J.
Colton, Roger B.
Connolly, Leonard W.
Constien, George C.
Converse, C. W.
Cook, Joseph
Cordes, Harold A.
Cordill, Anderson A.
Cornelius, Gwen L.
Cornelius, Wm. H.
Coulter, Robert M.
Coyle, Charles B.
Coyne, James J.
Crabb, Charles H.
Crank, Charles R.
Croll, Chauncey C.
Crumby, F. D.
Cummings, Robert T.
Dalton, Lucy
Dahlin, Olaj
Daum, H. W.
Davies, John A.
Davis, Homer L.
Davis, Richard R.
Davis, Robert E.
Day, Austin W.
Deady, Wm. W.
Dawson, Paul F.
Dean, Fleming H.
DeAngelis, A. J.
De Giorgio, Mary
Deikemore, Donna
Del Vitto, Jon M.
DeMar, John J., Jr.
DeMarr, James D.
Di Miro, R. R.
DeUry, Wm. C.
Dodge, K. E.
Dodge, Willard A.
Donaldson, Richard W.
Donnelly, Joseph E.
Dooley, Michael J.
Doone, Elliott E.
Doran, John J., Jr.
Dougherty, William
Douglas, Clyde J.
Downborough, A. A.
Downing, Donald R.
Drake, Chester
Drake, C. L., Sr.
Drew, J. L.
Driessel, S. T., Jr.
Duckett, Allen L.
Duirick, Donald E.
Dunnicliff, John D.
Durham, Loyd T.
d'Utassy, Chapman

Early, Woodrow W.
Eason, Robert K.
Eddy, Dayton W.
Edgal, Grant E.
Edgecomb, Norma J.
Edmunston, Alexander S
Edward, Nye K.
Edwards, James R.
Egenolf, William R.
Eilander, Ellen J.
Ehle, Harry
Eister, Ralph C.
Ekberg, Wm. A.
Eldredge, E. L.
Elliott, Albert M.
Elmer, Basil B., Jr.
Eltz, George J.
Emanuel, Emil H.
Embury, Melvin W.
Emer, Bob C.
Emery, Frederick L.
Eppstein, Julius
Ernest, Alice M.
Etheridge, Wilbur E.
Evans, M.
Evans, William R.

Fabis, Pat V.
Falck, Wilbert V.
Falune, Philip F.
Fancher, Chester R.
Farrens, Chas. W.
Feely, Maurice G.
Fell, Charles F.
Fellows, Clifford H.
Fever, Edwin
Ficocelli, Anthony J.
Fink, Sylvester F.
Firth, Shirley
Fisher, Edward J.
Fisher, Harry E.
Fishkin, Leon
Fithian, George W.
Fletcher, Gerrit N.
Floyd, W. R., Jr.
Flyzik, John A.
Foley, Robert H.

Foley, Thomas J., Jr.
Forbes, Donald E.
Forheutis, Mitchell
Forest, Henry W.
Foster, Robert M.
Fouts, Ben S.
Francis, John E.
Franke, Fritz A.
Frannall, J. M.
Frawley, James T.
Frederick, Frank J.
Frederick, Victor L.
Freidenberger, Herbert A., Jr.
French, Charlie D.
Frisby, Carl E.
Fritzsche, A. W.
Froehner, Delmar A.
Fry, Mervin J.
Fulp, Gordon D.
Fusselman, Victor C., Jr.

Gaines, David C.
Gainor, Ray
Galvin, R. W.
Garbellauo, David W.
Gardner, Grace A.
Gatkin, T. E.
Gensler, Maurice C.
Germano, Anthony J.
Gerstner, Robert C.
Getzoff, George W.
Gillette, Edwin
Girard, E. J.
Goodbey, Edward J.
Goodwin, Dwight A.
Gordiz, Joseph
Gorthing, Arthur P.
Gough, H. H.
Graboch, Paul L.
Grady, F. J.
Griffith, Joseph
Greene, E. W.
Griffin, Thomas E.
Grisham, Richard E.
Greenwell, William J.
Greer, J. D., Jr.
Gregory, Benj. F.
Gregory, Raymond H.
Grieder, Ruth K.
Grono, Ruben J.
Grover, Philip D.
Grudle, Howard E.
Guenthner, Howard S.
Guest, W. T.
Glenn, Richard C.
Glover, Edwin L.
Glynn, William E.

Hacker, Laurence W.
Hackett, Arthur P.
Haddock, J. W.
Haden, Harley J.
Hageman, Cornelius H.
Haggard, John V.
Hahn, Carsten C.
Halbedl, Donald
Hale, Joseph R.
Hall, Richard M.
Halvorson, Bradford H.
Hammel, Hal
Hammond, George F.
Hancock, Mahum F.
Hansen, Ernest E., Jr.
Hansen, Marjorie
Hansen, Svend C.
Hansher, Malcolm A.
Hanson, Gerard F.
Hanson, Howard J.
Hanson, R. M.
Hardin, D. C.
Harding, Claude D.
Harding, Joseph S.
Harman, Julian J.
Harman, R. L.
Harris, E. R.
Hart, John T., Jr.
Hart, Kenneth P.
Hartman, John A., Jr.
Hatch, Carl H.
Hauson, N. L.
Heath, Francis S., Jr.
Heatwole, J. W.
Heineman, L. M.
Heinicke, Hans W.
Heishan, F. A.
Helde, Erling A.
Henderson, James H.
Henderson, John J.
Hennig, Wm. J.
Hermanson, John H.
Herrick, Robert C.
Herron, Robert McK., III
Hertling, Adolph J.
Hester, Leonard C.
Heymann, Anna S.
Hinckley, John B.
Hirschhorn, Dorothy
Hirst, O. N.
Hitzenhammer, Anthony deV.
Hof, Robert T.
Hogan, Katharyn K.
Hogrefe, Wilhelm F.
Holbrook, Jack
Holland, Norman S.
Hollis, J. S.
Holt, Carelton
Hoodley, Randall L.
Horton, Robert G.
Horuak, Paul M.
Hoskins, Russell I.
House, Cyril A.
Houston, Roy
Hrabeck, Mary G.
Hubbell, John W.
Huber, Edward L.
Huggard, Leonard B.
Hughes, Alwyn A.
Hughes, J. I.
Hurley, J. E.
Huteson, John R.
Hyatt, John
Hyatt, Wm. R., Jr.
Hybner, Edward L.
Hyde, T. I.

Iannarone, Ralph P.
Inglis, Wm. G.
Ioppolo, Gaetauo
Ishigo, Kuniyuki
Israel, Sol E.

Jackson, Louis A., Jr.
Jackson, Robert W.
Jacoby, Fred A.
Jaksa, Robert F.
Jaksa, William
Jarsen, Howard
Jefferson, W. O.
Jenkins, Donald E.
Jerig, M. J.
Jernigan, R. J.
Jervey, Wm. W.
Jespersen, Alta
Jewell, Edward K.
Jewett, F. B.
Johantgen, Richard F.
Johnson, Franklin C.
Johnson, Kenneth D.
Johnson, Ray D.
Johnston, Wm. E.
Johnstone, Butty L.
Jones, Beverly M.
Jones, R. E.

Kalisch, Bertram
Kallander, Keith
Kapke, Delmar
Karslgfudt, Arthur G.
Kaufman, Paul A.
Keane, Wm. J.
Keim, Gordon B.
Kenworthy, Charles H.
Kieffer, Richard C.
Kiley, Richard H.
Kilgore, Richard R.
King, Charles W.
King, Justice B.
King, L. A.
King, M. E.
Kintz, Fred J.
Klein, Martin E.
Knigles, C. M.
Koler, Kenneth I.
Koons, Emily E.
Kornblith, L.
Kotila, Merlon M.
Kouth, Edward H.
Kraehenbuehl, John D.
Krause, Erwin A.
Kramel, Charles W.
Kressler, Durwood R.
Kretlow, Stanley A.
Kridel, Norman T.
Krieger, Charles
Kronimus, Walter
Kuhn, Robert N.
Kunen, James L.
Kussart, Jack P.

LaForest, Wilson H.
Lanahan, Francis H., Jr.
Larcher, Charles W.
LaReiche, Dorothy A.
Larson, Harry G.
Lawrence, Wm. K.
Lawson, Melvin M.
Lawton, K. B.
Leavenworth, C. B.
LeDrew, Jack H.
Lee, R. N.
Leege, Bert
Legg, John R.
LeLavou, L. H.
Lendurll, Milton S.
Leonard, Carroll S.
Lessem, N. H.
Lindstrom, Eugene E.
Linville, Sharon
Lippo, Edward
Litz, Wayne P.
Little, Norman L.
Lord, Robert L.
Lowe, Boca C.
Lowe, Otto B.
Luguer, Cornelius F.

MacDonald, T. R.
Mack, Wm. M.
MacKenty, John G.
MacQuaid, Earl J., Jr.
Madonick, Leon
Magee, Wm. L.
Maghakian, Martin
Mahler, R. A.
Maiy, Elsmore C.
Malony, John
Marano, Ralph R.
Marcy, Alfred R.
Markusich, Joseph
Marshall, Wm. J.
Marquez, R. D.
Marcus, S. G.
Marks, Wm. S., Jr.
Matejka, Jerry V.
Math, Angelo M.
Mathews, E. F.
Mauldin, Raymond H.
Maxwell, Robert C.
Mayron, George A.
Maze, Robert O.
Mda, Leon
Meacham, John L.
Meagher, Joseph A.
Meagley, William A.
Meek, Paul D.
Meens, Charles L.
Meloiu, N., Jr.
Mellano, Angelo J.
Menhennick, A. E.
Mercer, Daniel H., Jr.
Meredith, Kenneth M.
Michaelis, L. A.
Miller, Fred G.
Miller, Willis C.
Milliken, C. M.
Minkes, Henry S.
Minsk, Paul E.
Mitcham, W. J.
Mitchell, D. H.
Modell, Clarion
Mohn, George V.
Moll, Walter S.
Moore, Charles F.
Moore, Don G.
Moore, Mill J.
Moore, Richard G.
Moore, Richard E.
Moore, Wm. C.
Moran, Alfred I.
Morris, Edward H.
Morris, George W.
Morris, M. H.
Morris, Raymond A.
Morya, Felix
Mueller, E. L. P.
Munez, Jose E.
Murphy, Charles
Muscolino, Frank
Muter, Leslie F.
Michelson, John W.
Mickelman, Elmer H.
Miller, Charles A.
Miller, Gladys M.
Miller, N.
Miller, Robert W.
Myers, Edward A.
McCabe, J. S.
McAteer, Robert H.
McAuliff, Dan
McCall, R. F.
McCarley, J. W. J.
McCarty, Justin J.
McCredy, W. H.
McCoy, Howard K.
McCrory, Edward L., Jr.
McCullough, Jean F.
McCurdy, Harold L.
McElroy, R. J.
McKechnie, Alex R.
McKenzie, Timothy N.
McGhee, James J.
McMillin, Randall R.
McMurray, Donald F.
McNeill, John
McPherson, Jack D. G.
McTierman, Thomas A.
McVeigh, Joseph

Nahress, Milton G., Jr.
Narksutrei, Carroll M.
Nelson, Charles J.
Nelson, Donald H.
Nelson, Marion
Nelson, Merdis A.
Ness, R. N.
Neubauer, William C.
Neville, Douglas H.
Newhouse, A. B.
Nicolai, George E.
Nielsen, Edward L.
Nielsen, Henry H.
Noble, D. E.
Nocerimi, Leonard P.
Northrup, George R.
Nowlin, Dale W.
Nugent, George L.

O'Brien, J.
O'Doul, Joseph A.
Ogden, Williams
O'Connell, James D.
O'Connor, Daniel J.
Olmon, W. E.
Oliver, Benjamin H., Jr.
Olsen, Theodore W.
Olsen, Willard R.
O'Phelan, Wm. J.
Orraca, R. A.
O'Shea, Joseph G.
Ostrom, Herbert W.
Otstot, Robert E., Jr.
Ott, J. J., Jr.
Overly, Hugh A.
Owen, Robert S., Jr.
Pace, L.
Pachard, John H.
Pakes, Edward
Paquette, N. L.
Parker, John R.
Parker, Robert O.
Parker, S. R.
Parkin, W. H.
Parsons, Theodore W.
Parsons, Lloyd C.
Partridge, Carlyle A.
Paterson, John A.
Patterson, George C.
Pauli, Frank A.
Paulson, C. Robert
Pawlikowski, Blair R.
Pautre, C. A.
Pickering, Samuel T.
Pilibosian, Kasper
Pear, Bernard
Pearson, Janice
Pepelnjak, Wm. N.
Petrillo, Edward W.
Peters, Gerald O.
Peuce, William F.
Pochyla, B. H.
Pope, Theodore N.
Postler, Robert A.
Powell, E. I.
Powell, Wm. F.
Power, Wm. L.
Pratt, Robert L.
Prentice, Robert
Preston, Charles B.
Prigge, Henry T.
Prince, Susanna
Price, Robert K.
Pritchard, Dalton H.
Proffer, Estes E.
Proper, A. F.
Pruitt, George G.
Pryor, Joe L.

Quigley, Quentin S.
Quinn, Joseph F.
Quintana, Joseph P.

Ramsey, C. C.
Randall, A. S.
Rappaport, Harry
Raschke, Herbert A.
Rauschhuber, Emory C.
McPherson, Larry G.
Rebman, Maude
Reed, Ernest L.
Rehm, Wendell L.
Reichelderfer, Harry
Rentz, N. H.
Repella, Joseph
Rhome, Eugene E.
Rich, Benjamin P.
Richmond, Edward L.
Rider, Charles W.
Rider, Gilmore W.
Ried, Kenneth C.
Rinezi, Thomas M.
Roane, John P.
Roberts, John L.
Roberts, J. A.
Robertson, Sydenham B.
Robinson, A., Jr.
Robinson, F. S.
Roblin, G. W.
Rockar, Wm. F.
Rogers, Wm. J.
Roller, August F.
Rollins, Robert B.
Root, Leverne R.
Rose, I. H.
Rosenbaum, J.
Ross, Luther J.
Rossi, Aldo R.
Roudebush, Wilson E.
Rouse, Isabella G.
Rudd, Milton C.
Runner, Edwin C.
Rush, Clifford

Russell, Francis A.
Russell, J. B.

St. John, Mildred M.
Samuelson, Cyrus D.
Savage, LaMar H.
Sawyer, C. H.
Scarangella, Nicholas A.
Schaal, Frank J.
Schafer, Paul J.
Schafer, Vernon L.
Schenck, Herbert H.
Schnable, George L.
Schumann, F. S.
Schuster, Charles E.
Schutte, H. E.
Schwartz, Oscar A.
Scovil, Charles S.
Secoy, Mary L.
Seibert, Jacob R.
Selby, Harry B.
Sendell, Richard L.
Serig, H. W.
Sessions, Javet
Setzer, A. L.
Severson, Arnold M.
Shattuck, A. B.
Shaver, Keith W.
Shaw, Ralph W.
Shaw, Carl J.
Sheedy, John
Sheirah, Frank G., Jr.
Shepard, Wm. McKinley
Shields, David W.
Shoup, Earl W.
Sichak, Peter
Silikovitz, M.
Sims, Stuart H.
Sinnote, Harry J.
Skeen, Beth
Skinner, Arthur L.
Skultety, Wm. M.
Skual, Joachin A.
Slack, J. K.
Slater, Alfred P.
Slater, R. B., Jr.
Slattery, John J.
Slaven, Robert K.
Small, Robert E.
Smith, F. E.
Smith, Leon C.
Smith, R. J.
Smith, Walter I., Jr.
Smith, John F.
Smoler, Alan
Snyder, Burr M.
Soldner, Arved M.
Solitro, Frank
Solotwa, Stephen
Sollie, Sigurd A.
Sopko, Joseph S.
Speir, Wilbert A.
Stackli, C. L.
Stackpole, Howard W.
Stapp, Pauline
Starkey, Ernest
Staunton, Roy C.
Steele, F. H.
Steinmetz, George R.
Stellner, W. H.
Stephens, J. M.
Stevens, Harry B.
Stevens, Robert L.
Stiles, Merrill R.
Stine, S. L.
Stmauch, Winston G.
Stoddard, Maxine
Stoker, Ellen
Stone, Albert W.
Storms, Harry E.
Strader, Kenneth G.
Strally, Michael J.
Strunk, Robert W.
Strutz, Theodore H.
Studer, R. W.
Studler, Carl H.
Spencer, R. L.

Spieldook, E.
Sullivan, Sardis M.
Sutton, John P.
Swanson, Arthur D.
Sypher, Cushman M.
Sturdevant, Leslie

Taner, Carlos A.
Tanner, Verna E.
Tasko, A., Jr.
Tatom, Louis J.
Taylor, Leland
Telquist, Clark V.
Terry, Woodrow
Tervola, Victor V.
Thayer, Mary R.
Thomas, Robert E.
Thomson, John D.
Thomas, W. E., Jr.
Thompson, Donald G.
Thompson, Francis G.
Thompson, George R.
Thompson, Henry G.
Thompson, Ira W.
Thornton, Laurence C.
Toft, Douglas O.
Tompkins, Henry F., Jr.
Tompkins, Minthorne M.
Toole, Ignatius V.
Trachman, Lester
Tracy, Raymond J.
Trepanier, David F.
Trivett, Harold L.
Tudor, R. N.
Tully, Terence J.
Tuten, Charles
Tyler, Everett G.

Unger, Francis G.
Urban, Rudolph T.

Valentine, Edward W.
Vasquez, A. B.
Van Dolteren, Charles J.
Van der Veer, J. D.
VanSandt, Wm. A.
Varney, Evelyn
Vaughn, Florence
Vehe, Earl R.
Vehkaoja, Thomas M.
Volp, Louis J.
Voudree, Marion W. C.

Wagar, Arthur E.
Waite, B.
Waldron, J. C.
Waller, Robert O.
Wallroth, Maurice
Walton, E. W.
Ward, Henry A.
Wardle, Dannell E.
Washburn, David E.
Watkins, Robert V.
Watson, C. L.
Watson, S. R., Jr.
Watters, John E.
Wavering, E. H.
Weber, Frederick C.
Webster, Harold
Weil, Ira L.
Weise, L.
Wells, Henry J., Jr.
Weltzien, Dan F.
Wentura, Paul A.
Wentz, W. S.
Wessel, Vincent G.
West, Dan C.
West, Frank T.
Wheeler, Hugh C.
White, E. C.
White, Wm. L.
Whitebrook, Lloyd G.
Whitesell, Carlin H.
Whiting, Cuthbert R.
Whitmore, L. W.
Whitmore, Rodneu G.
Whittmore, P. B.
Wichner, William T.

Wigle, Ernest A.
Wilber, Leo C.
Wild, Henry I.
Wilkinson, Louie H.
Wille, Earl C.
Williams, Lee R.
Williams, Wm. A.
Wilkes, Lowell L.
Wilson, John H.
Wilson, W. A.
Wing, Lee N.
Winigren, Harry M.
Winkler, Warren W.
Winter, Norman L.
Wold, E. C.
Wood, Vernon A.
Worland, Harry
Worthington, Neal
Wozencraft, Frank W.
Wright, H. J.

Yarborough, F. A.
Yaworski, John
Ydeen, Brooks C.
Young, Wm. M.

Zimmer, Charles F.
Zehule, C. A.
Zoller, Bob G.

AUGUST — 1946

Abbott, J. G.
Abernathy, M. H.
Abrams, A. G.
Abrams, E. B.
Ackerman, L. B.
Adair, F. L.
Adams, H. W.
Adler, J.
Adams, L. L.
Adelman, G. W.
Adey, Edwin A.
Adinaro, J. F.
Adorneth, J.
Adrian, F. M.
Aee, D. G. K.
Aguiar, V.
Aiken, Bruce T.
Ainsworth, J. F.
Aitzman, K. F.
Akers, N. E.
Aksomaitis, C. F.
Alexa, J. W.
Algonas, C. W.
Allardice, W. H.
Allen, L.
Allen, Joanne
Althaus, V. E.
Ammerman, R. H.
Amms, J. E.
Andeoun, Y. J.
Anderson, H. C.
Anderson, L.
Anderson, N. G.
Anderson, P.
Ankenbrandt, F. L.
Apple, T. A.
Applegate, E. W., Jr.
Aravosis, J. S.
Aronian, R. A. J.
Arthur, G.
Aruett, W. E.
Arvel, C. L., Jr.
Asta, H.
Atkinson, A.
Atwell, Wm. F.
Atwood, J. W.
Augus, H. R.
Auker, D. E.
Avery, H. A.

Baden, L. V.
Bady, I.
Baird, T. N.
Baker, E. W.
Baker, H. S.
Baker, R. J.
Baker, Wm. D.
Baldwin, C. H.
Baldwin, H. A.
Banfield, T. T.
Barnett, W. H., Jr.
Barrett, G. A.
Barrett, B. R.
Barron, A. V.
Barry, S.
Baruch, J. F.
Baschinsky, M.
Bashcraft, V.
Bastian, C. W.
Bates, E. S.
Baudy, M. E.
Bauman, I.
Bawere, R.
Bayly, Naomi C.
Beall, Carl F.
Beam, M. D.
Beatty, C. C.
Becker, L. C.
Becker, J. M.
Beckley, R. J.
Bediosian, A. D.
Beelton, R. N.
Belqim, Harry N.
Belknap, F. M.
Bell, A. R.
Bell, J. C.
Belou, H. L.
Benjamin, A.
Benjamin, R. S.
Bennett, J. R.
Bent, J. G., Jr.
Berge, F. L.
Bergelis, D.
Berger, S.
Bernauer, F. L.
Bernstein, L.
Bernstein, M.
Bess, W. B.
Bessey, C. E.
Bibby, B. W.
Biernick, P. E.
Bieter, W. A.
Bilenky, A.
Billmeier, W. J.
Black, J. A., Jr.
Black, J. T.
Blain, Ray
Black, R.
Bleier, D.
Bornholdt, J. N.
Boross, A.
Botzum, J. R.
Bodkin, C. E.
Bochik, B. F.
Bois, R. L.
Booger, Wm. L.
Bolds, E.
Boomer, J. R.
Boone, R. G.
Bowen, A. E.
Bowen, J. C.
Bowman, C.
Boyer, Earl E.
Bracken, J. R.
Bradley, J. L.
Bradshaw, B. C.
Brady, B. J.
Bramowitz, R. A.
Bratton, L. B.
Braze, F. E.
Brechel, H. W.
Breece, C. E.
Brener, Marcia
Brenner, M. M.
Breslin, J. T.
Brewer, W. O.
Brickler, A. T.
Bridges, F. R.
Bright, M. L.
Brittain, O. C.
Bruer, G. A.
Brown, A. L.
Brown, Chas. B.
Brown, D.
Brown, D. F.
Brown, G. W.
Brown, J. A.
Brown, J. W.
Brown, M. A.
Brown, M. E.
Brown, T. A.
Brown, W. C.
Brown, Wm. C.
Browne, G. A.
Buchanan, H. S., Jr.
Buck, C. L.
Bucker, John C.
Buckingham, B. H.
Bubes, R. F.
Budd, C. K.
Budenkaye, A. C.
Burke, J. L.
Buries, A. C., Jr.
Burns, H. R.
Burt, A. E.
Burtt, G. T.
Butler, H.
Byrnes, H. J.

Cahill, F., Jr.
Campbell, T. R.
Carder, E. A.
Caron, B. W.
Carroll, J. V.
Carson, F. R.
Cartagena, A. L.
Carter, S. G.
Castellini, N. R.
Caten, B. C.
Catson, B. O.
Catucci, H. J.
Cauble, G. B.
Cauger, A. V., Jr.
Cavenaugh, D. E.
Caynes, H. A.
Cazinners, J. B.
Celli, F. E.
Cerini, B. T.
Cervellin, M. G.
Chadwick, M. P.
Chaille, H. G.
Chamberlin, C. N.
Chappell, J. F.
Chapman, L. C.
Chase, R. L.
Chazariow, S.
Cherry, G. F.
Chevalier, F. C.
Child, T. M.
Chilingerian, C. S.
Civilincome, F. A.
Clapp, R. C.
Clark, C. H.
Clark, M. R.
Clark, R. E.
Clark, T. C.
Cleaves, H. H.
Clemence, R. B.
Clough, H. W.
Coates, Proctor G.
Coe, J. P., Jr.
Coer, J., Jr.
Cohen, A.
Cohn, H.
Coller, L. C.
Collins, H.
Conrad, V. A.
Cook, J.
Cook, L. W.
Cooley, G. F., Jr.
Cooper, Carroll M.
Cooper, R. B.
Coppell, C. L.
Cordell, E. L.
Cornell, J. P.
Corput, R. V. D.
Cox, S. M.
Cox, T. H.
Crane, J. L.

Crentz, J. H.
Criss, D. E.
Cronenwith, R. W.
Crusa, R. L.
Curtis, D. C.
Curtis, F. J.
Cusack, J. N.
Czaykowski, W. C.

Daggett, E. M.
Daires, D. E.
Dairs, H.
Dairs, A. H.
Daniel, A. F.
Danko, S. F.
Davis, A. C.
Davis, C. B.
Davis, J. E.
Davis, P. L.
Davison, C. R.
Day, Paul C.
Deady, J. E.
DeHart, Wm.
Delano, A. W.
Dennis, R. W.
DeNucci, A. J.
DeSaix, C. P.
Desquin, P. E.
Devere, M. G.
DeVore, C.
DeWaet, E. A.
Dickinson, H. P.
Dickson, D. A., Jr.
Dietrich, F.
Dill, R. B.
Dip, F. Z.
Duiguid, J. H.
Dodd, F.
Dodson, S. E.
Donat, L. W.
Donnelly, A. R.
Donzel, A. A.
Douglas, H.
Douglass, R. N.
Dorsey, G. N.
Dow, James M.
Dowd, T. P.
Drachy, L. A.
Drade, L. H.
Driscoll, J. A.
Dronglis, J. V.
Dudman, W.
Dunbar, O. C.
Dunlap, R. E.
Dupree, James E.
Durett, Wm.
Duval, J. G.

Eastmond, H. V.
Ebling, Wm. F., Jr.
Eckstrom, J. P.
Eddy, F. D.
Edwards, J. G.
Egli, J. J.
Egnor, R. L.
Ehrlich, S. B.
Elcau, M. C.
Ellis, B. F.
Ellis, G. B.
Ellis, Wm. H.
Elliott, A. S.
Elliot, R. H.
Elliott, Wm. B., Jr.
Elwell, R. G.
Emerian, A. D.
Engelhardt, H. L.
Engleman, H.
Enoch, G.
Evans, Wm. T.
Everitt, J. A.
Evers, J. T.
Eyerman, W. F.
Ezment, A. B.

Facok, W.
Faralla, Raoul A.
Farrar, B. F.
Fay, J. M.
Feeney, A. H.
Feiree, K. S.
Fernandez, J. F.
Ferre, J. B.
Festner, R. H.
Field, N. J.
Fill, G. J.
Fillers, A. H.
Finckelstein, S.
Firehock, H.
Fischbach, A.
Fischer, C. O.
Fischer, G. F.
Fitzgerald, J. S.
Fitzgerald, L. P.
Flagg, C. R.
Flauter, N.
Flenner, G. B.
Fletcher, K. L.
Floersheimer, A.
Flynn, A. C.
Foerg, A. H.
Foley, P. H.
Forbes, M. B.
Forster, A. C.
Fowinier, A. M.
Francis, C. L.
Frankel, G.
Franken, Wm.
Frausbach, A. A.
Frawley, K. E.
Freeman, R. C.
Freich, A. G.
Frick, M. L., Jr.
Fucetola, J., Jr.
Fuchs, J.

Gabris, M.
Gaffey, J. S.
Gallagher, H. T.
Gallagher, Kola S.
Galloway, M. L.
Ganong, H. M.
Gardner, P. B.
Garson, A. T.
Gassert, H.
Gau, R. A.
Gaun, A. H., Jr.
Gauswell, L. W.
Gaynor, A. W.
Geate, Chas. L.
Gerkin, L.
Geller, D.
Gerding, H. V.
George, E. H.
Gerson, A.
Gikow, E.
Gilette, M. E.
Gill, D. W.
Giovetti, A.
Glassman, S.
Gleasm, E. F.
Gleason, I. W.
Glendinning, E. W.
Glenn, J. R.
Gloqouscan, R.
Goldman, A. T.
Goldman, M. N.
Goodwin, C. E.
Gore, T. S.
Gorham, J. E.
Gornee, A. R.
Goodwin, C. D.
Greable, J. B., Jr.
Green, M.
Green, G. E.
Greeman, S. I.
Greer, Wm. R.
Grey, G. R.
Grievling, E. W.
Grier, B. W.
Griffith, G. G.
Grimm, R. E.
Grines, W. M.
Groll, S. J.
Gross, W.
Grubb, W. C.
Grupe, K. L.
Guashneck, E. J.
Gulick, L. R.
Gunnest, R. M.
Gulsona, F.

Hagood, T. T.
Hale, R. E.
Hall, F. M.
Hall, M. W.
Hall, W. H.
Hancock, D. W.
Hanson, G. B.
Harback, H. D.
Hardy, F. E.
Hare, T. J.
Harding, G. E.
Harlow, H. V., Jr.
Harods, A. W.
Harrieton, Wm. D.
Harris, B. B.
Harris, J. D.
Harris, J. F.
Harris, W. E.
Hatfield, R. B.
Havel, J. M.
Hawthorne, A. K.
Hayes, H. G.
Hays, Wm. W.
Hazell, J. W., Jr.
Heacosh, L. F., Jr.
Hedgecock, A. W.
Heilshart, R. E.
Heinsechvot, M. L.
Helgeotad, J. E.
Hendrix, W. M.
Herbert, C. W.
Higgins, Wm. A.
Hiltner, E. B.
Hinschman, F. L.
Hindin, A.
Hinelfast, F.
Hitchcock, L. N.
Hixson, J. D.
Hoffman, T. P.
Hogan, R. D.
Holden, C. A.
Holliday, J. O.
Holmgrain, B. E.
Horn, J. B.
Horner, A. A.
Horning, E. M.
House, G. E.
Hoyne, Jerome A.
Hoyt, C. F.
Hsoton, T. G.
Hubbard, B. R.
Hubbard, T. G.
Hudson, W. J.
Hueley, E. P.
Hughes, R. S.
Hulick, H. M.
Hunter, W. E.
Hupich, G. I.
Hurst, F. C.
Hurbut, J. F.
Hussey, E. G.
Hussey, J. W.
Hyans, S. R.
Hyman, S. C.

Ipri, V.

Jabroff, C.
Jackman, C.
Jackson, H. G.
Jackson, T. W.
Jackson, R. W.
Jackson, Wm. G.
Janes, C. W.
Jacobs, H. W.
Jensen, A. C.
Jewell, G. A.
Jockin, W. D.
John, F. T.
Johnson, E. W.
Johnson, G. D.
Johnson, H. H.
Johnson, J. P.
Johnson, K. L.
Johnson, L. G.
Johnson, M. A.
Johnson, M. R.
Johnson, R. N.
Johnson, R. O.
Johnson, W. O.
Jones, C. R.
Jordan, H. R.
Joseph, A. L.
Joya, Wm. Y., Jr.
Jurgelas, J.

Kacos, E. R.
Kahn, D.
Kahn, H.
Kaiman, H. T.
Kamin, V. A.
Kane, G. C.
Kaprelian, E. K.
Kaputa, J. M.
Karpovich, F.
Karwas, F. C.
Kavanaugh, E. V.
Kearney, R. F.
Kearns, T. A.
Keller, F. P.
Kelly, H. M.
Kellar, L. F.
Kelly, Wm. I.
Kelton, E. C.
Kensingar, R. R.
Kent, O.
Kenyon, J. J.
Kerr, R. H.
Keuge, R. W.
Keyes, Wm. R.
Kimbrough, J. M.
King, J. L.
Kingsbury, J. B.
Kitts, H. L.
Klein, Wm. E.
Kober, Wm.
Koch, E.
Koenig, E. P.
Kolliu, J.
Komcroske, A. B.
Kornelis, Wm. S.
Koslor, M. J.
Kovalsler, F. E.
Kozoroff, R. M.
Knoll, R. M.
Krueger, C. F.
Krusen, Wm. L.
Krueting, J. L.
Kucera, J. H.
Kucher, E. H.
Kugler, E. M.
Kugler, L.
Kuig, E. S.
Kulsimiji, R. A.
Kurkijan, G. A.
Kurzejewski, L. S.
Kyer, F. E.

La Costa, J. D.
Lacy, R. E.
Lamplough, E.
Lampart, R. C.
Languick, R. B.
Land, B. E.
Lane, O. H.
Lannes, D. B.
Larnboley, J. J.
Larsen, C. L.
Lattin, J.
Lawrence, L. S.
Laverick, W. J.
Lawton, H. M.
Leatherman, G. F.
Leavenworth, H. M.
Le Bedda, J. M.
Lee, B. S.
Lee, H. S.
Lee, N. E.
Lee, R. E.
Lee, D. P.
Leeds, A. W.
Lehrbaum, E. L.
Leirne, H.
Leman, S.
Leri, F. D.
Lesczcynski, S. W.
Leslie, C. E.
Lestman, R. H.
Le Urino, R. B.
Levis, R. E.
Levy, E. H.
Lewis, F.
Lewis, N. E.
Link, J. M.
Linden, D.
Linderman, L. E.
Liner, I. S.
Lipkowitz, J. J.
Lipp, J. P.
Litvak, A. M.
Lively, D. M.
Lockwood, C. C.
Lohmaren, F.
Long, A. E.
Lord, R.
Lormax, H. M.
Losch, V. H.
Losser, F. C.
Loveless, Wm. B.
Lowe, J.
Lowell, M. L.
Lurd, C. V.
Luther, C. B.
Lutz, W. C., Jr.
Lynch, P. G.
Lyman, R. P.
Lyons, O. I.

Mabry, A. W., Jr.
MacKay, H. O.
Mackenzie, C. G.
Mack, Wm.
MacNeill, C.
Maden, Wm. B.
Maddocks, T. H.
Madwell, C. R., Jr.
Magee, J. F.
Maggio, T.
Malkin, S.
Manger, L.
Marko, F. M.
Marsh, Wm. A.
Marshall, F. M.
Martin, F. E.
Martin, G. E.
Martin, H. J.
Martin, J. E.
Martin, P. E.
Martins, A. F.
Marx, F. P.
Maselli, Carlo B.
Maserjian, E. J.
Maslow, B.
Maslyn, V. M.
Mason, A. R.
Masselie, A. L.
Mathila, H. N.
Matzinger, K.
Maudel, H. T.
Maury, E. S.
Mawhinney, A. S.
Maxwell, S. C.
Mayer, H. J.
Mazzi, E. J.
Mayer, A. R.
Meachen, L. R.
Meer, Hung Hong
Mehy, B. C.
Meehan, J. A.
Mellen, Wm. T.
Mellon, H. J.
Melvin, M. R.
Meola, E. A.
Messer, Herbert G.
Messler, R. E.

Meyers, L.
Miller, A.
Miller, B. S.
Miller, E. E., Jr.
Miller, F. T.
Miller, L. A.
Miller, M. M.
Miller, R. A.
Miller, R. B.
Miller, Wm. L.
Mitchell, H.
Mlynczak, L. L.
Moe, R. E.
Moldoff, D.
Moncrief, J. L.
Monroe, H. B.
Moody, M.
Moore, C.
Moore, F. R.
Moore, L. E.
Moore, M. D.
Moore, M. S.
Morgan, C. C.
Moritz, M.
Morris, C. E.
Morris, M. M.
Morris, R. M.
Morris, S. A.
Morrow, H.
Morton, Dudley K.
Moskowitz, I. L.
Moss, N. H.
Moynaham, G. F., Jr.
Mrgudick, J. N.
Mudlbauer, L. C.
Muedavin, M. E.
Muir, W. A.
Muller, Mark T.
Mundy, P. F.
Munsey, Nicholas G.
Munzer, P. A.
Murdock, J. W.
Murphy, M. A.
Myers, F. K.
McAlexander, Wm. C.
McCaudless, C. L.
McCarthy, C.
McCarthy, B. T.
McCaughey, J. M.
McAvoy, D. F.
McCormack, J. L.
McCoy, J. W.
McCullin, F. E.
McDonald, H. D.
McDowell, D. L.
McDowell, D. L.
McDuff, E. G.
McElwel, D. W.
McKenney, C. A.
McKnight, C. F.
McFerman, Wm. R.
McGalliard, A., Jr.
McGinnis, N. F.
McGinnis, I. H.
McGrath, V. J.
McKenna, J. J.
McKennon, L. P.
McLarney, J. F.
McMahon, E. M.
McMorran, D. K.
McNeel, L.
McWhite, B. C.
Meyers, C. A.

Nakano, R. T.
Neal, D. J.
Nehman, R. K.
Redcay, P. I.
Neilson, M.
Neisener, F. C.
Nelson, C. W.
Neuman, E. L.
Newton, B. F.
Nickline, Harry F.
Noble, B. I.
Norton, K. A.
Novaky, G.
Novicki, V. C.
Nutt, J. F.
Nye, W. J.

O'Connor, M. C.
Olasiu, G.
Olivere, S. S.
Oliverson, L. M.
Olton, P. T., Jr.
O'Neil, J. J.
Oppenheim, B. T.
Orauk, F. J.
O'Reilly, W. P.
Orlan, T.
Ortz, J.
O'Rourke, T. I.
Osche, R. A.
Osgood, V. L.
Ostrander, L. W.
Otto, C. A.
Owens, G. T.
Owens, H. L.

Page, A. W.
Palijas, J. K., Jr.
Parker, D. T.
Parker, H. D.
Parker, T. L.
Parkerfelder, J. H.
Parmer, H. W.
Pasche, E. J.
Paulmann, E.
Paxton, J. M.
Payne, V. F.
Pdaud, C. H.
Pelou, C.
Pelton, D. J.
Pemberton, E. L.
Perillo, V. P.
Perkins, H. H.
Perkins, J. E.
Perkins, O. D.
Perlock, S. G.
Peskowitz, M. A.
Peta, J.
Peterson, Clarissa
Peterson, R. I.
Petnisky, M.
Pflanz, L. W., Jr.
Pfeiffer, P. E.
Picchwii, Dominick P.
Pick, L. A.
Pikus, H.
Pilch, E.
Plass, A. W.
Plate, J. T.
Pomoich, D.
Pooley, E.
Porter, R. B.
Poston, H.
Potter, J. C.
Powers, E. A.
Prater, W. T.
Previse, S. W.
Price, H. G.
Pritchard, A. C.
Priebe, F. K.
Primer, H. M.
Pritchard, L. C.
Prochmon, E. W.
Pulley, B. I.
Puroy, T. A.

Quinn, D. F., Jr.

Racine, M. F.
Rahm, A. M.
Randall, A. O.
Rauscher, Wm. V.
Rause, M. E.
Read, C. A.
Rearick, C. A.
Redfern, R. E.
Reed, Wm. R.
Reeves, Wm. C.
Reiley, W. M.
Reinke, I.
Reiss, L.
Remie, E.
Reynolds, E. R.
Reynolds, F. M.
Richards, G. E.
Richardson, D. J.
Richey, LeRoy M.
Richman, Russell C.
Ricks, R. C.
Rifkin, W. A.
Ringer, O. K.
Rippke, B. R.
Risen, E. L.
Roberts, A. O.
Roberts, B. R.
Robinson, R. T.
Robson, W. H.
Roche, M. M.
Rod, L. S.
Rodgers, J. M.
Rodican, E. B.
Rodriguez, Paul D.
Rogers, A. W.
Rogers, C. W.
Rogers, P. H. C.
Roggenburger, L. S.
Rokau, L.
Rooks, Wm. A.
Rosati, S. B.
Rosenbaum, I. P.
Rosenberger, S. C.
Rosenfeld, M.
Ross, A. H.
Ross, R. W.
Ross, T. N.
Rothberg, L.
Rothfuss, A. G.
Rowe, R. J.
Russell, J. A.
Russell, M. T.
Ryan, J. S.
Ryan, R. H.
Ryan, Wm. E.
Ryerson, Wm. I.

Saaeth, E. V.
Sablitz, H. H.
Sakatos, M. J.
Salkind, H.
Salz, I. F.
Samariau, J. G.
Sanderson, W. W.
Sandoual, J.
Sangster, J. M.
Sattler, W. P.
Sawyer, L. E.
Scarek, D. E.
Schainkau, J.
Scheel, Willard J.
Schiemaner, W. W.
Schifflin, C. J.
Schiro, F. P.
Schmidt, R. A.
Schneider, S. F.
Schnitz, S. M.
Scott, W. K.
Schreimann, H. H.
Schultz, J. N.
Schwartz, J.
Scott, Wm. J.
Seibert, Wm. L.
Serra, Manuel, Jr.
Seudden, P. G.
Seudder, H. H.
Shane, P. T.
Shaw, A. D.
Shelton, R. J.
Sherman, M. F.
Shepard, C. C.
Shore, H.
Shorr, W.
Siegel, S. B.
Silverman, S.
Sing, T. G.
Singer, M.
Simmons, G. M.
Simpson, W. A.
Skobel, Max
Skrypski, E. J.
Slack, R. F.
Slattery, R. E.
Smith, A.
Smith, F.
Smith, H.
Smithling, J. F.
Snedacker, G. W.
Snorffa, Wm. N.
Sobolof, J.
Soden, J. W.
Sopp, A. L.
Spaeth, E. V.
Speyer, I. T.
Spirey, U.
Spivrod, L.
Squires, O. G.
Staley, R. W.
Stanford, L. H.
Stanley, C. A.
Stanley, J. M.
Stansell, J. A.
Staples, J. F.
Stauffer, B. A.
Steinberg, J.
Stienmann, C. A.
Stephen, J. E.
Stephens, P. C.
Stephenson, A. D.
Stern, B.
Stimison, D. C.
Stokes, F. M.
Stoll, I. C.
Stone, E. P.
Storie, J. C.
Stork, S. R.
Stout, H. L.
Strong, G. G.
Stroube, W. J.
Stewart, C. A.
Suci, G. T.
Suddreth, D. W.
Suffern, N. G.
Sullivan, Alden P.
Sullivan, J. E.
Sussdorff, R. R.
Sutherland, E. P.
Swansen, E. W.

Tauipier, O. M.
Tax, W. A.
Taylor, R.
Taylor, T. R.
Tebley, R. P.
Tebon, E. T.
Teierman, B.
Templeton, J. S.
Tepper, C.
Teusen, S. W.
Therrien, G. T.
Thomas, J. S.
Thompson, H. R.
Thompson, Wm. H., Jr.
Thompson, F. R.
Thompson, K. P.
Thorpe, C. L.
Thurston, E. S.
Tibbs, C. C.
Tidd, J. L.
Tiege, C., Jr.
Tilsom, L.
Tilton, D. I.
Tilton, I. E.
Timmons, J. F.
Todd, W.
Tolnas, O. J.
Tones, J. T.
Tong, L.
Totten, J. E.
Toublin, B. L.
Travis, A. C.
Truesdale, Wm. H.
Tripper, P. C.
Tryon, H. F.
Tucci, S.
Tucker, S.
Tuckerman, James R.
Turkington, J. L.
Turner, E. A.
Tyer, D. N.

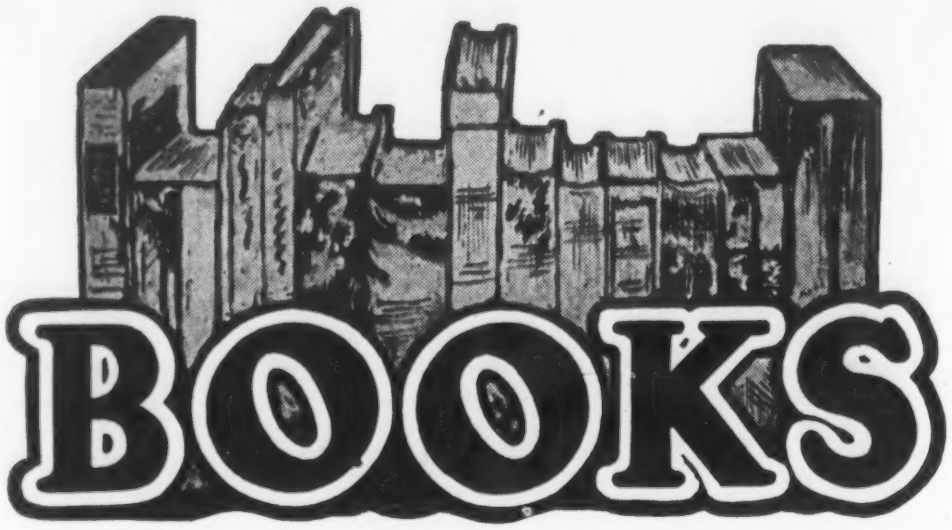
Ucascole, A. O.
Uher, R. F.
Umanoff, M. S.

Vaccaro, M. J.
Van Brunt, H. L.
Valiasak, J. W.
VanAuiringe, J. D.
Vanden Bett, B. H.
Van Brunt, R. T.
Van Dorn, F.
Van Der Vert, C. O.
Vandewater, K. A.
Van Nuys, J. S.
Van Steenberg, A.
Van Wickle, E. I.
Vasileff, N.
Viergauer, W. L.
Villarrnel, I.
Vital, Wm. F.
Voigt, H. V.
Vosburgh, R. V.

Wade, W.
Wahl, R. T.
Walker, H. C.
Walker, R. W.
Walton, H. K.
Waus, C. W.
Weber, J.
Weiner, S. A.
Weinrib, S.
Weiss, R. O.
Weitz, Wm. E.
Weiver, J.
Werner, L.
Wernimout, W. H.
West, K. A.
Whalen, J. B.
Whethenberg, C. B.
White, C. E.
White, O. R.
Whitehead, A. V.
Whitehead, B. A.
Whitehead, W. T.
Whitley, G. H., Jr.
Wiegel, E. A.
Wiegeshaus, E.
Williams, G. G.
Williams, H. C.
Williams, O. N.
Williams, Wm. M.
Williamson, C. M.
Wilcox, L. E.
Wilson, R. E.
Wilson, J. O.
Wilson, W. E.
Winston, A.
Winston, H.
Wirden, J. W.
Wissmann, R. A.
Wolcott, M. E.
Wolff, A. S.
Wollack, A. H.
Womack, N. M.
Wood, C. A.
Wood, G. F.
Wood, J. J.
Wood, R. A.
Wood, W. A.
Wooley, G. F.
Wooley, L. D.
Worden, M. G.
Wright, F. H.

Yopp, C. J.
Young, D. S.
Young, H. H.
Young, R. H.

Zagaja, J. W.
Zanuck, D. F.
Zeigiebel, A. F.
Zeitz, A.
Zimmer, J. W.



AND SERVICES

R. L. O'CONNOR, Secretary

GLOBAL MISSION. By H. H. Arnold, General of the Air Force. Harper and Brothers. $5.00.

THE Arnold work has every chance of breaking through the barrier of apathy which for years has been evident in the field of aviation literature. *Global Mission* is the first book which can sweep the years from the Wright brothers to the present.

Not more than a handful of men have the range of experience necessary for such a work. Air Marshals Trenchard, Portal and Tedder in the United Kingdom, and Generals Arnold, Spaatz, Kenney, Knerr, Anderson and Doolittle and Navy's Admiral Towers in the United States would almost exhaust the possibilities.

General Arnold has had the fortunate habit of keeping careful personal records ever since his cadet days at West Point. *Global Mission* is the source record of countless vital details of air development which had been lost sight of or distorted in the passage of time.

Above and beyond the exciting reading it produces is the potential impact of the volume on the evolving defense strategy.

In retrospect, the significance of General Arnold and his confreres was to prevent stagnation of defense concept between the two wars.

This book belongs in everyone's library alongside the chronicles of World War II experiences by Eisenhower, Stimson, Churchill and other World War II top leaders.

ADVANCES IN ELECTRONICS. Edited by L. Marton. Academic Press, Inc. 275 pages. $9.00.

THIS is Volume I of what is intended to be a yearly publication recording progress in electronics research and development.

The following ten articles are included: Oxide Coated Cathodes, by Albert S. Eisenstein (Univ. of Mo.); Secondary Electron Emission, by Kenneth G. McKay (Bell Labs.); Television Pick-up Tubes and the Problem of Vision, by A. Rose (RCA Labs.); The Deflection of Beams of Charged Particles, by R. G. E. Hutter (Sylvania); Modern Mass Spectroscopy, by Mark G. Ingraham (Argonne National Lab.); Particle Accelerators, by M. Stanley Livingston (Brookhaven National Lab.); Ionospheric Research, by A. G. McNish (National Bureau of Standards); Cosmic Radio Noise, by Jack W. Herbstreit (National Bureau of Standards); Propagation in the FM Broadcast Band, by Kenneth A. Norton (National Bureau of Standards); and Electronic Aids to Navigation, by J. A. Pierce (Harvard Univ.).

THE EAGLE IN THE EGG. By Oliver LaFarge. Houghton, Mifflin Co. 320 pages. $3.50.

MAYBE the airfield had icebergs around it, or a few palm trees. It might be Nome, Nadzab or Abadan. But the people who belonged to the flying machines were much the same, whether muffled in parkas or sweating through T shirts.

Junior birdmen and their seniors came and went—here today and gone tomorrow — while the ground crews stayed on forever, blistering their hands on metal that froze at the Arctic or scorched at the Equator.

Thus the work got done, grinding around the clock. The Air Transport Command was spreading north, east, south and west to girdle the globe, always in a hurry. Often it was hurry up and wait, as the author freely admits. Col. LaFarge, although serving as historical officer of the ATC, saw far too much during 80,000 miles of wartime flight to pretend otherwise.

His 320-page story of the war development of an organization that produced the Berlin Airlift is obviously an honest appraisal by a creative artist. His work bears testimony to the fact that no generals were looking over his shoulder. He saw many flaws in the organization he served during the war years, without losing sight of the majestic proportions, the color and significance of the big picture.

The book is solidly based on statistical detail, but its appeal is vastly widened by anecdotes, personality sketches, characterizations and a wealth of description.

Col. LaFarge does not neglect the men and women behind the great transport and ferrying service, either on the home front or the desolate, isolated, womanless bases where communications and maintenance personnel were stuck for the duration.

CONSTRUCTIVE USES OF ATOMIC ENERGY. Edited by S. C. Rothmann. Harper & Bros. 258 pages. $3.00.

IN THIS year 5 of the Atomic Era there are few human beings who are not aware of the frightful potentialities of atomic energy for destruction.

But atomic energy may be even more significant in its potentialities for good than it is for evil. Here is the first book to describe for the layman this "Peaceful Atom"—the uses to which it is already being put in many fields of science and industry, and further possibilities being opened up by research.

Constructive Uses of Atomic Energy brings together, in unified and easily understood form, fourteen articles by outstanding authorities in atomic research. The table of contents shows the scope of the treatment and the positions of the writers.

This book provides a clear and comprehensive picture of an exciting subject, highlighting its utilitarian values and directing attention to its everyday usefulness. Twenty-four half-tones and many drawings illuminate the text. It is a book for the intelligent layman who is interested in the potentialities of the outstanding phenomenon of our time. And it is a book for the scientist working in other fields than nuclear physics who is interested in the extensive possibilities of atomic energy in general scientific research.

Above all, it is a book for the industrial executive, who is here offered abundant evidence that the technology of the atom is rapidly becoming an integral part of American industry, with unlimited future possibilities.

GENERAL KENNEY REPORTS. By George C. Kenney. Duell, Sloan & Pearce, Inc. $5.00.

THRILLING, fast-moving history by the commanding general of the Allied Air Forces of the Southwest Pacific.

Complete coverage of the tactics and strategy of the Pacific Air War. Island-by-island history of the march across the Pacific—Buna, Gona, Doboduras,

Marilinan, Wewak, Nadzab, Lae, Rabaul, Los Negros, Hollandia, Noemfoor, Sansapor, Morotai, Leyte, and Ormoc.

The story of the Fifth and Thirteenth Air Forces—their skip-bombing, low-altitude strafing, and parafrag bombing,

The Battle of the Bismarck Sea, and the Battle of Leyte Gulf.

The never-before-published story of Colonel Lindbergh's role in Southwest Pacific operations.

An unforgettable portrait of General Douglas MacArthur.

An exciting personal history drawn from an extraordinary wartime diary, this book was planned, written, designed, and illustrated by General Kenney himself.

RADIO AIDS TO NAVIGATION. By R. A. Smith. Cambridge Univ. Press and The Macmillan Co. 110 pages. $2.50.

THE sudden rise of the importance of electronic aids to navigation during the war has left many officers feeling the need for a single concise summary of the latest developments and applications. While many line officers become more or less familiar with one or more of the new devices through actual use, few, if any, have an over-all picture of the role radio aids can and will play in future navigation, especially air navigation.

This volume, written by a man who was closely connected with the planning and development of wartime projects through his association with the Telecommunications Research Establishment in England, would seem to fill this need and also to present a technical discussion of the various equipments, formerly of a classified nature, to the interested civilian.

The volume will be of most value for its excellent presentation of the British and German systems comparable to our Loran system, and for its accurate summary and evaluation of Loran itself.

This small book will be an invaluable addition to the electronics officer's library, and with the exceptions noted provides an able summary of wartime developments and their probable peacetime extension. — *U. S. Naval Institute Proceedings.*

ELECTRON TUBES. Edited by Arthur F. Van Dyck, Robert S. Burnap, Edward T. Dickey and George M. K. Baker. Publ. by RCA Review. Vol. I 475 pages; Vol. II 454 pages. $2.50 per volume.

NINTH and tenth in the RCA Technical Book Series, these two volumes include all the more important papers published since 1935 by RCA research workers on the subject of electron tubes. Volume I covers the period from 1935 to 1949; Volume II contains papers published between 1942 and 1948.

The papers are grouped under four heads: general, transmitting, receiving and special. Some of them appear in full; others in summary form. This makes possible the inclusion in the two

INSIGNIA OF THE ASSOCIATION

AVAILABLE TO MEMBERS FROM THE SERVICE DEPARTMENT

The insignia of the Association in several beautiful designs and convenient styles authorized for wear by members is available at the prices quoted below. The insignia is described as follows:

The central figure is an alert powerful American eagle with strong talons clutching lightning flashes—symbolic of a strong America and national defense—especially insofar as modern communications is concerned, our basic reason for existence. The border consists of leaves of the olive branch of peace, showing that the object of military preparedness in America is to assure a lasting peace. In the background are signal flags—the first means of signalling in sea and land warfare by United States forces. Just above the eagle and between his outstretched wings is a heavy bomber in flight, symbolizing the complicated and essential communications in the Air Force, and in Naval and Marine aviation. Above that is a radar antenna array, and at the very top a radio relay antenna—for the latest major step in military communications. And none of these could exist without industry—the foundation of AFCA. In the color version there are the traditional colors of the signal flags—dexter white with red center and sinister red with white center—with a gold border to the whole.

THE ASSOCIATION MEDAL

Wrought on the medal in sharp and bold relief is the AFCA insignia. It is 1 inch in diameter. The ribbon to which the medal is suspended is of heavy grosgrain silk in orange and dark blue. Price $3.25. The medal is authorized for wear on the uniform as provided in A.R. 600-40, paragraph 68 g and 70 c (2) (dated 31 March, 1944). Medal not available for sale to student members.

Members should take every opportunity to display AFCA insignia. The emblem worn on the uniform or civilian dress, or displayed on the wall of the home or office, carries with it an identification of distinction, is highly decorative, and helps to widen the scope of our Association by bringing it to the attention of others. The emblem is now issued in a variety of attractive forms.

LAPEL BUTTON FOR CIVILIAN WEAR

Bronze	**$1.25**	**(including tax)**
Sterling	**1.25**	**(including tax)**
10-K Gold	**4.80**	**(including tax)**

Specify whether signal flags should be in red and white enamel or plain.

MEMBERSHIP CERTIFICATES

Printed on fine diploma paper with the Association emblem in full color and the member's name engrossed.
Price $1.50.

BINDER FOR SIGNALS

Red Leatherette with Gilt Lettering

The magazines can be placed in the binder easily, in a few minutes. Each binder holds one volume of SIGNALS (issues for 1 year). This handsome, stoutly constructed, durable, imitation leather cover will preserve your magazines permanently. The name of the publication and the year of the issues contained therein will be stamped on the back of each binder.

Binders for previous years can be obtained at the same price. When ordering binders be sure to state the years desired.

EACH BINDER—PRICE $2.00

Our Book Department can furnish, in limited quantity, any book currently in print. We will also help you to secure older titles that you may need to complete your library. A 10% discount is allowed all Association members on orders of $2.50 or more except for technical books. Please indicate author and publisher where known, and allow at least three weeks for procurement and delivery. (We will place orders also for any overseas or isolated station reader of SIGNALS, but without the discount if not a member.)

volumes of a larger number of papers than would have been possible had all been printed in full.

A very complete bibliography of periodical literature on vacuum tubes is included, as well as a listing of the RCA Tube Department's Application Notes published from 1933 to the present date.

INDUSTRIAL ELECTRONICS AND CONTROL. by R. G. Kloeffler. 438 pages. John Wiley & Sons, Inc. $6.00.

A THOROUGH survey of the theory and applications of electronics in industry. This work is complete in its coverage from basic electron tube theory, associated circuits, control component devices, through all the major applications in the industrial and commercial field. Clearly written, here is valuable material on the basic components of control and servomechanisms. All circuit diagrams conform to the A.S.A. graphical symbols. Especially designed to meet the requirements of the engineering student who needs a knowledge of industrial electronic applications.

INDUSTRIAL ELECTRONICS REFERENCE BOOK, by 37 Electronics Engineers of the Westinghouse Electric Corporation. 678 pages. John Wiley & Sons, Inc. $7.50.

THIS book gives the theoretical electronic data and application information needed by the engineer to thoroughly understand the underlying principles as well as the scope and limiting factors of electronic apparatus applied to industrial processes. The 37 engineer-authors of this unusual work have been intimately associated with the rapidly expanding electronic field during the past decade, and have imparted many valuable and lasting contributions to this branch of electrical engineering.

COMPANY ADMINISTRATION AND PERSONNEL RECORDS. By Col. C. M. Virtue. 374 pages. $2.50.

A HANDY compendium of useful information for the company grade officer or non-commissioned officer assigned to personnel duties. Recent Department of the Army changes are included. The new enlisted ranks, the change from sergeant to mess steward, the career plan, the fact that any company officer may now sign the morning report, and enlisted efficiency reports are some of the matters explained. As in previous editions, each paragraph of the text cites the appropriate Army regulation or other authority. This book will enable the reserve officer or the new first sergeant to put his finger immediately on any problem of administration. Well indexed and arranged, the contents are clear and easily understood. Much of the author's experience and the customs of the service are included. It should be a great help as a refresher to those members of all components of the Army who have not been directly concerned in company administration lately. Definitely recommended.

ELECTRO-OPTICAL CHARACTERISTICS OF TELEVISION SYSTEMS, by Otto H. Schade, RCA Review.

NOTE: This paper consists of an Introduction and four parts: Part I—Characteristics of Vision and Visual Systems; Part II—Electro-Optical Specifications for Television Systems; Part III—Electro-Optical Characteristics of Camera Systems; Part IV—Correlation and Evaluation of Electro-Optical Characteristics of Imaging Systems. The Introduction and Part I appeared in the March 1948 issue of *RCA Review*, Part II in the June 1948 issue, and Part III in the September 1948 issue. Part IV, the concluding part, follows.

Summary—Principal characteristics of the motion picture process are evaluated and co-ordinated with the television process by determining the transfer characteristics, signal-to-fluctuation ratios, and the aperture flux response of photographic film. A quantitative analysis and comparison of the performance of specific imaging systems such as the standard television and motion picture system is undertaken. The transfer characteristics of the image orthicon and the gradation scale of television images are treated in greater detail, and the critical brightness for threshold grain visibility (noise) is determined from the optical signal-to-fluctuation ratio in the reproduced image.

INDEX TO ADVERTISERS

	Page No.
Ampex Electric Corporation	41
Arnold Engineering Company	35
Automatic Electric Company	2
Breeze Corporations, Inc.	33
General Cable Corporation	1
General Electric Company	47
Hallicrafters Company	*4th Cover*
Eitel-McCullough, Inc.	*3rd Cover*
International Resistance Company	39
International Telephone and Telegraph Corp.	37
Kellogg Switchboard & Supply Company	31
Radio Corporation of America	49
Ray-O-Vac Company	43
Sherron Electronics Company	53
Sperry Gyroscope Company	4
Times Facsimile Corporation	*2nd Cover*
Western Electric Company	45

Books and Manuals

Soviet Arms & Soviet Power (Guillaume)	$ 3.50
Communism: Its Plans and Tactics	2.00
If Russia Strikes (George Fielding Eliot)	2.75
I Chose Freedom (Kravchenko)	1.49
Strange Alliance (top command in Russia—Gen. Deane)	3.75
Atomic Energy Report (Smyth)	1.25
Hiroshima (John Hersey)	1.75
Command Decision (Haines)	2.50
Guard of Honor (Cozzens)	3.50
No Bugles Tonight (Lancaster)	3.00
Eisenhower—Crusade in Europe	5.00
Geo. C. Marshall—Reports (1939-1943)	1.50
Geo. C. Marshall Report (1943-45)	.25
Map supplement	1.25
Marshall, King, Arnold—War Reports	7.50
Patton—War as I Knew It	4.00
Stilwell—Stilwell Papers	4.00
Churchill—Gathering Storm	6.00
Churchill—Their Finest Hour	6.00
Churchill—Secret Speeches	2.00
Churchill—Roving Commission	3.50
Admiral Halsey's Story	4.00
McNair—Educator of an Army	2.00
Eleven Generals—Greene, Sheridan, Bradley, etc.	5.00
Pershing, Gen. John J. (Col. Palmer)	2.00
All But Me and Thee (Non-battle Casualties)	2.75

BOOKS FOR THE STAFF OFFICER

National Security and the Gen. Staff (History, U. S. Staff)	$ 5.00
Practical Manual of Martial Law (Wiener)	2.50
Riot Control (Col. Wood)	2.50
Airborne Warfare (Gen. Gavin)	3.00
Flying Fortress (Collison)	2.50
Carrier War (Jensen)	2.50
German Generals Talk (Hart)	4.00
Hitler and His Admirals	4.00

HISTORY

American Sea Power Since 1775	$ 5.00
Marines War (Fletcher Pratt)	5.00
Medal of Honor	4.50
Navy's War	2.75
Official History of A.A.F. (McCoy)	10.00
On Active Service (Stimson)	5.00
Story of West Point (Dupuy)	.25
U. S. Army in War & Peace (Spaulding)	6.00
West Point (Crane & Kieley)	7.50
Yank: GI Story of the War	5.00
Ordeal by Fire (Pratt)	5.00
Gettysburg (Miers & Brown)	3.50
House Divided (Longstreet & Richmond)	5:75
Lee's Lieutenants, 3 vols. (Freeman) each	7.00

Follow the Leaders to

Eimac TUBES

The Power for R-F

Circuit Research

HELPS BUILD BETTER VACUUM TUBES

With the increasing demand for higher powers at higher frequencies the importance of close relationship between tube and circuit design has become paramount.

A large segment of the laboratory facilities at Eitel-McCullough is concerned with the development of basic new circuits closely correlated with vacuum tube development. The efforts of this group are receiving wide recognition for their outstanding accomplishments. These new circuits are being made available, as developed, to the industry enabling greater realization of a vacuum tube's potential abilities.

Evidence of these efforts is illustrated above . . . A 14-tube annular r-f generator. This compact equipment can provide 500 watts of CW power at 1000-Mc, and has operating possibilities as high as 2500-Mc. This is but one application of the basic annular circuit design developed by Eimac. The power-output in such a generator is directly proportional to the number of tubes used, and single tube efficiency is maintained.

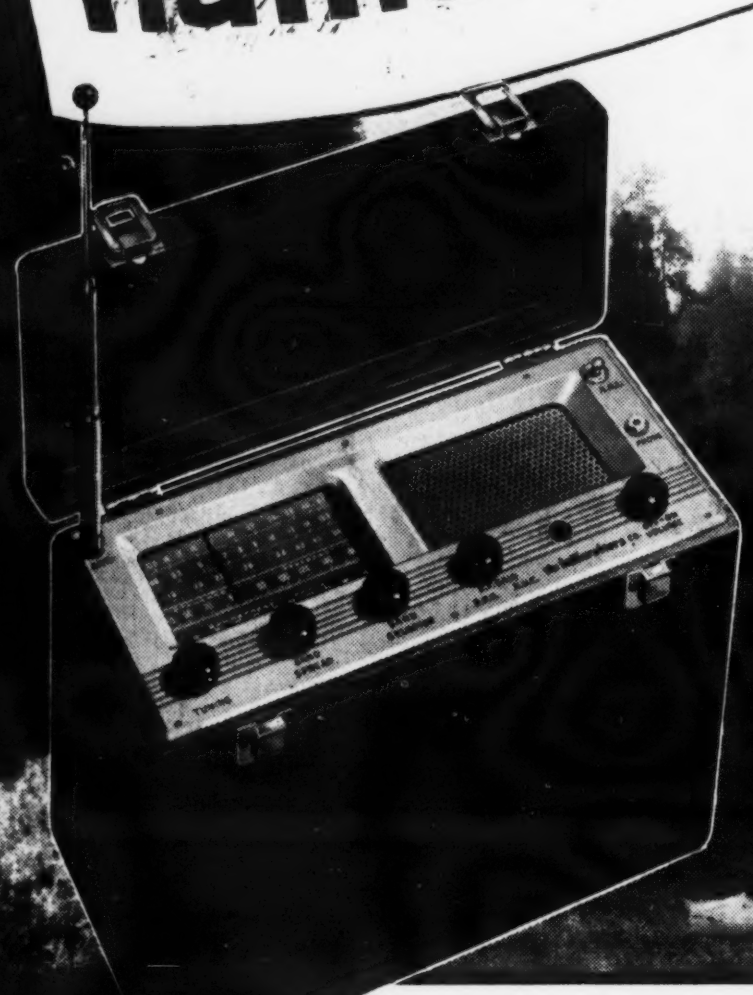
EITEL-McCULLOUGH INC.

728 SAN MATEO AVE., SAN BRUNO, CALIFORNIA

Export Agents: Frazar & Hansen, 301 Clay St., San Francisco, California

New hallicrafters Portable communications receiver . . .

MODEL S-72
$79.95



• All set to go places with you — *anywhere!* Extra *sensitivity* for weak signal areas . . . extra *performance* for good Ham operation.

The newest thing in portables, just introduced by Hallicrafters. One r-f, two i-f stages. Range 540 kc to 31 Mc in 4 Bands. 8 tubes plus rectifier. AC, DC, or batteries.

Long-Wave Version — S-72L, covers airways range and control towers frequency, omitting highest short-wave band. $89.95.

the hallicrafters co.

4401 W. Fifth Ave. • Chicago 24, Ill.

Manufacturers of Precision Radio and Television Equipment